

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Reissue

Application of: Bill L. Davis and Jesse S. Williamson

Entitled: COMBINED LITHOGRAPHIC/FLEXOGRAPHIC  
PRINTING APPARATUS AND PROCESS

For: Reissue of U.S. Patent 5,630,363

Filed: May 20, 1999

Serial No.: 09/315,796

Examiner: Not Yet Assigned

Group Art Unit: 2854

SUPPLEMENTAL STATEMENT OF PRIOR ART AND OTHER INFORMATION

APPENDIX 8

VIII. File History Pertinent to Series Commencing with United States  
Serial No. 08/538,422 filed October 2, 1995 and Counterparts

Index No.      Description

68      File History of European Patent Application No. EP 0 767 058 A3 entitled: Printing Press, Applicant: Howard W. DeMoore, Inventors: Howard W. DeMoore, Ronald M. Rendleman and John W. Bird, Date of Publication A3: June 10, 1998, Date of Publication A2: April 9, 1997

[illegible]



EPA/EPO/OEB  
D-80298 München  
089/2399-0  
TX 523 656 epmu d  
FAX 089/2399-4465

Europäisches  
Patentamt

European  
Patent Office

Office européen  
des brevets

Generaldirektion 2

Directorate General 2

Direction Générale 2

BIRD & BIRD  
ATTN: MS. CECILIA CHEUNG  
90 FETTER LANE  
LONDON EC4A 1JP  
GREAT BRITAIN

## Rechnung / Invoice / Facture

Kundennummer  
Customer number 01500251  
Numéro du client

Datum/Date

20/07/99

Zeichen/Ref./Réf. <b>LIBRY.0666</b>	Anmeldung Nr./Application No./Demande n°/Patent Nr./Patent No./Brevet n° <b>96250217.5 2304 0767058</b>
Anmelder/Applicant/Demandeur/Patentinhaber/Proprietor/Titulaire <b>DeMoore, Howard W.</b>	

### Übersendung von/Transmission of/Envoi de

Antrag vom/Request dated/Requête du 14/06/99

- ☒ Kopien bei Akteneinsicht nach Regel 94(3) EPÜ  
Copies in the case of inspection of files pursuant to Rule 94(3) EPC  
Copies en cas d'inspection publique selon la règle 94(3) CBE
- ☐ Beglaubigung  
Certification  
Certification
- ☐ — Prioritätsbeleg(e)/priority document(s)/document(s) de priorité R. 94(4)
- ☐ — Ausfertigung(en) der Patenturkunde nach Regel 54(2) EPÜ  
Duplicate of the patent certificate pursuant to Rule 54(2) EPC  
Duplicata du certificat de brevet, selon la Règle 54(2) CBE
- ☐ Auszug aus dem Register nach Regel 92(3) EPÜ  
Extract from the register pursuant to Rule 92(3) EPC  
Extrait du registre selon la Règle 92(3) CBE
- ☐ Auskunft aus den Akten nach Regel 95 EPÜ  
Communication of information contained in the files pursuant to Rule 95 EPC  
Communication d'informations contenues dans la dossier selon la Règle 95 CBE
- ☐ Akteneinsicht nach Regel 94(2) EPÜ  
Inspection of files pursuant to Rule 94(2) EPC  
Inspection publique selon la Règle 94(2) CBE

### Rechnung Nr./Invoice No./Facture N° 20189455

Bitte bei Zahlung unbedingt angeben  
Indicate number without fail when paying  
Ce n° doit absolument être indiqué lors du paiement

EUR

Gegenwert  
Equivalent GBP  
Contre-valeur

Verwaltungsgebühr/Administration fee/Taxe d'administration		20,00	13,50
Kosten für Kopien/Cost of copies/Frais pour copies (_____)	242		
	Blätter pages feuilles	145,20	96,80
Telefax		0,00	0,00
Summe/Total/Montant total		165,20	110,30
gezahlt sind/already paid/montant versé		0,00	0,00
noch zu zahlen/outstanding/reste à payer		165,20	110,30

☐ Der obengenannte Betrag wird abgebucht vom laufenden Konto  
The above sum will be debited from deposit account  
Le montant susmentionné sera débité du compte courant

Nr.  
No.  
n° \_\_\_\_\_

☒ Der obengenannte Betrag ist nach den auf der Anlage angegebenen Zahlungsmöglichkeiten zu entrichten (f. 2566.1 + 2).  
The above sum is payable as detailed on the annex (f. 2566.1 + 2).  
Le montant indiqué ci-dessus doit être acquitté suivant les modalités figurant sur l'annexe (f. 2566.1 + 2).

GARRY A G (TEL: 2375)



✉ EPA/EPO/OEB  
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Generaldirektion 2

Directorate General 2

Direction Générale 2

### Zahlungsmöglichkeiten

Nach Art. 5 der Gebührenordnung können die Gebühren wie folgt entrichtet werden:

- a) durch Einzahlung oder Überweisung auf ein Bankkonto des Amts,
- b) durch Einzahlung oder Überweisung auf ein Postscheckkonto des Amts,
- c) durch Übergabe oder Übersendung von Schecks, die an die Order des Amts lauten,
- d) durch Abbuchung von einem laufenden Konto beim Amt.

Die Zahlungswährung richtet sich nach der Währung des Staats, in dem das Konto geführt wird.

Der Betrag ist "ohne Kosten für den Empfänger" zu überweisen.

Das Verzeichnis der für die Europäische Patentorganisation eröffneten Bank- und Postscheckkonten, sowie der entsprechenden Zahlungswährungen ist auf Form 2566.2 abgedruckt.

### Methods of payment

Under Art. 5 of the rules relating to Fees the fees may be paid as follows:

- a) by payment or transfer to a bank account held by the Office,
- b) by payment or transfer to a giro account held by the Office,
- c) by delivery or remittance of cheques which are made payable to the Office,
- d) by debiting a deposit account held with the Office.

The currency for payment is determined by the currency of the State in which the account is held.

The fee is to be transferred "at no costs to the payee".

The list of bank and giro accounts opened in the name of the European Patent Organisation and corresponding currencies for payment is reproduced on Form 2566.2.

### Modalités de paiement

Aux termes de l'article 5 du Règlement relatif aux taxes, les taxes peuvent être acquittées comme suit:

- a) par versement ou virement à un compte bancaire de l'Office,
- b) par versement ou virement à un compte chèques postal de l'Office,
- c) par remise ou envoi de chèques établis à l'ordre de l'Office,
- d) par prélèvement sur un compte courant ouvert auprès de l'Office.

Le paiement doit être effectué dans la monnaie de l'Etat où le compte est ouvert.

Le virement doit se faire "sans frais pour le destinataire".

La liste des comptes bancaires et de chèques postaux ouverts au nom de l'Organisation européenne des brevets et des monnaies de paiement correspondantes est reprise sur le formulaire Form 2566.2.



Verzeichnis der für die  
Europäische Patentorganisation  
eröffneten Bank- und Giro-  
Postcheckkonten sowie der  
entsprechenden  
Zahlungswährungen

List of bank and giro accounts  
opened in the name of the  
European Patent Organization  
and corresponding currencies  
for payment

Liste des comptes bancaires et  
de chèques postaux ouverts au  
nom de l'Organisation  
européenne des brevets et  
des monnaies de paiement  
correspondantes

	Bankkonten Bank accounts Comptes bancaires	Postcheckkonten Giro accounts Comptes de chèques postaux	Zahlungswährung Currency for payment Monnaies de paiement
AT	N° 102-133-851/00 (BLZ 12000) Bank Austria AG Am Hof 2 A-1010 Wien	N° 7451 030 Österreichische Postsparkasse Georg-Coch-Platz 2 A-1018 Wien	Österr. Schilling (ATS/EUR)
BE	N° 310-0448878-78 Banque Bruxelles Lambert BP 848 B-1000 Bruxelles	N° 000-115-4426-28 Banque de la Poste B-1100 Bruxelles	Franc belge (BEF/EUR)
CH	N° 322 005 01 B UBS CH-8021 Zurich	N° 30-38786-1 Zahlungsbank PTT Verarbeitungszentrum CH-4040 Basel	Franc suisse (CHF)
CY	N° 0155-06-000-650 Bank of Cyprus 21, Evagoras Av. P. O. Box 1472 CY - 1580 Nicosia		Cyprus Pound (CYP)
DE	N° 3 338 800 00 (BLZ 700 800 00) Dresdner Bank Promenadeplatz 7 D-80273 München	N° 300-800 (BLZ 700 100 80) Postbank München D-80398 München	Deutsche Mark (DEM/EUR)
DK	N° 3015133738 Den Danske Bank Holmens Kanal Dept. Holmens Kanal 2 DK-1060 København K.	N° 889-5883 GIROBANK A/S Girostrøget 1 DK-0800 Høje Taastrup	Danske kroner (DKK)
ES	N° 0104/0328/35/0303480024 Banco Exterior de España Carrera de San Jerónimo 38 E-28014 Madrid	N° 00-18716786 Caja Postal Cuentas Extranjeras Pº de Recoletos, 5 E-28070 Madrid	Peseta española (ESP/EUR)
FI	N° 200118-182078 Merita Bank Sensatorit FIN-00020 Merita	N° 800013-80485 Leona Fehmankatu 23 FIN-00007 Helsinki	Suomen Markka (FIM/EUR)
FR	N° 200 20463, Code banque 30 084, Code guichet 00 567, Cle Rib 29 Banque Nationale de Paris Agence France-Etranger 2 Place de l'Opéra F-75002 Paris		Franc français (FRF/EUR)
GB	N° 60 271 489 (sorting-code 20-00-00) Barclays Bank PLC 54 Lombard Street P O Box 544 GB-London EC3V 9EX		Pound Sterling (GBP)
GR	N° 112002002007046 Credit Bank AE Athens Tower Branch 2, Messoghion Avenue GR-115 27 Athens		Greek Drachma (GRD)
IE	N° 30882201 (Bank Code 80-14-80) Bank of Ireland Lower Baggot Street Branch P O Box 3131 IRL-Dublin 2		Irish pound (IEP/EUR)
IT	N° 036832 01 84, ABI 02002 / CAB 03208 Banca Commerciale Italiana Via del Plebiscito 112 I-00188 Roma	N° 10568277 Poste Italiane C.U.A.S. Piazza Vesuvio 6 I-20144 Milano	Lira italiana (ITL/EUR)
LU	N° 7-108/9134/200 Banque Internationale à Luxembourg 68, route d'Esch L-2653 Luxembourg	N° 25-21-37 Administration des P & T Chèques postaux BP 2300 L-1080 Luxembourg	Franc belge (BEF/EUR)
MC	N° 254 22754, Code Banque 30 004, Code Guichet 08 178, Cle Rib 81 Banque Nationale de Paris Succursale de Monte-Carlo Galerie Charles III Avenue des Spélugues Boîte Postale 123 MC-95007 Monaco Cedex		Franc français (FRF/EUR)
NL	N° 51 36 38 547 ABN-AMRO Bank NV Kneuterdijk 1, Postbus 165 NL-2501 AP Den Haag	N° 4012827 Postbank NV NL-6800 MA Arnhem	Nederlandsse Gulden (NLG/EUR)
PT	N° 0015/020 0808381145 / 05 Banco Pinto et Sotto Mayor Av. Fontes Pereira de Melo 7 P-1000 Lisboa		Escudo português (PTE/EUR)
SE	N° 122 687 108 Bankgiro N° 5843-8155 Svenska Handelsbanken S-10670 Stockholm	N° 7 41 53-8 Postgirot S-10506 Stockholm	Svenska kronor (SEK)



# Antrag auf Erteilung eines europäischen Patents / Request for grant of a European patent / Requête en délivrance d'un brevet européen

Bestätigung einer bereits durch Telekopie (Telefax) eingereichten Anmeldung / Confirmation of an application already filed by facsimile / Confirmation d'une demande déjà déposée par télécopie  
Wenn ja, Datum der Übermittlung der Telekopie und Name der Einreichungsbehörde / If yes, facsimile date and name of the authority with which the documents were filed / Si oui, date d'envoi de la télécopie et nom de l'autorité de dépôt

Nur für amtlichen Gebrauch / For official use only / Cadre réservé à l'administration			25	ANL ZEICHN
Anmeldenummer / Application No. / N° de la demande	MKEY	1	96250217.5	
Tag des Eingangs (Regel 24(2)) / Date of receipt (Rule 24(2)) / Date de réception (règle 24(2))	DREC	2	02.10.1996	
Tag des Eingangs beim EPA (Regel 24(4)) / Date of receipt at EPO (Rule 24(4)) / Date de réception à l'OEB (règle 24(4))	RENA	3		
Anmeldetag / Date of filing / Date de dépôt		4		
Tabulatoren-Positionen / Tabulation marks / Arrêts de tabulation				
Es wird die Erteilung eines europäischen Patents und gemäß Artikel 94 die Prüfung der Anmeldung beantragt / Grant of a European patent, and examination of the application under Article 94, are hereby requested / Il est demandé la délivrance d'un brevet européen et, conformément à l'article 94, l'examen de la demande			EXAM 4	5
Zeichen des Anmelders oder Vertreters (max 15 Positionen) / Applicant's or representative's reference (maximum 15 spaces) / Référence du demandeur ou du mandataire (max 15 caractères ou espaces)			AREF	6
ANMELDER / APPLICANT / DEMANDEUR Name / Nom				7
Anschrift / Address / Adresse				8
APPR 01 # 157922917				
# DEST #				
Zustellanschrift / Address for correspondence / Adresse pour la correspondance				9
PADR				10
Staat des Wohnsitzes oder Sitzes / State of residence or of principal place of business / Etat du domicile ou du siège				11
Staatsangehörigkeit / Nationality / Nationalité				12
Telefon / Telephone / Téléphone				13
Telex / Télex				14
Telefax / Fax / Téléfax				15
Weitere(r) Anmelder auf Zusatzblatt / Additional applicant(s) on additional sheet / Autre(s) demandeur(s) sur feuille additionnelle				16
VERTRETER / REPRESENTATIVE / MANDATAIRE: Name / Nom				17
(Nur einen Vertreter angeben, der in das europäische Patentregister eingetragen und an den zugestellt wird / Name only one representative, who is to be listed in the Register of European Patents and to whom notification is to be made / N'indiquer qu'un seul mandataire, qui sera inscrit au Registre européen des brevets et auquel signification sera faite)				18
FREP 01 110101117 #				19
Geschäftsanschrift / Address of place of business / Adresse professionnelle				
Telefon / Telephone / Téléphone				
Telex / Télex				
Telefax / Fax / Téléfax				
Weitere(r) Vertreter auf Zusatzblatt / Additional representative(s) on additional sheet / Autre(s) mandataire(s) sur feuille additionnelle				

<p><b>Vollmacht / Authorisation / Pouvoir:</b> ist beigefügt / is enclosed / ci-joint</p> <p>ist registriert unter Nummer / has been registered under No. / a été enregistré sous le n°</p> <p style="text-align: right;"><b>GENA</b></p> <p><b>ERFINDER / INVENTOR / INVENTEUR:</b></p> <p>Anmelder ist (sind) alleinige(r) Erfinder / The applicant(s) is (are) the sole inventor(s) / Le(s) demandeur(s) est (sont) le (les) seul(s) inventeur(s)</p> <p>Erfindernennung auf gesondertem Schriftstück / Designation of inventor attached / Voir la désignation de l'inventeur ci-jointe</p> <p><b>BEZEICHNUNG DER ERFINDUNG / TITLE OF INVENTION / TITRE DE L'INVENTION:</b></p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> TIDE      TIEN      TIFR </div> <p><b>PRIORITÄTSEKKLÄRUNG / DECLARATION OF PRIORITY / DECLARATION DE PRIORITE</b></p> <p>01 # # #</p> <p>02 # # #</p> <p>03 # # #</p> <p>04 # # #</p> <p>Weitere Prioritätserklärung(en) auf Zusatzblatt / Additional declaration(s) of priority on additional sheet / Autre(s) déclaration(s) de priorité sur feuille additionnelle</p> <p><b>MIKROORGANISMEN      MICRO-ORGANISMS</b></p> <div style="display: flex;"> <div style="flex: 1;"> <p>Die Erfindung betrifft einen Mikroorganismus (mehrere Mikroorganismen) oder seine (ihre) Verwendung, der (die) auf Grund des Budapest-Vertrages oder eines bilateralen Abkommens zwischen der Hinterlegungsstelle und dem EPA nach Regel 28(1) a) bei einer anerkannten Hinterlegungsstelle hinterlegt worden ist (sind), um die Bedingungen für die Offenbarung der Erfindung gemäß Artikel 83 in Verbindung mit Regel 28 zu erfüllen</p> </div> <div style="flex: 1;"> <p>The invention relates to and/or uses (a) micro-organism(s) deposited for the purposes of disclosure pursuant to Article 83 in conjunction with Rule 28 with a depositary institution recognised within the meaning of Rule 28(1) (a) under either the Budapest Treaty or a bilateral agreement between the institution and the EPO</p> </div> </div> <p style="text-align: center;"><b>MICO 1 #           #</b></p> <p>Die Angaben nach Regel 28(1) c) sind in den technischen Anmeldeunterlagen enthalten auf / The particulars referred to in Rule 28(1) (c) are given in the technical documents in the application on / Les indications visées à la règle 28(1) c) figurent dans les pièces techniques de la demande à la /aux</p> <p>werden später mitgeteilt / will be submitted at a later date / seront communiquées ultérieurement</p> <p>Die Empfangsbescheinigung(en) der Hinterlegungsstelle ist (sind) beigefügt / The receipt(s) of deposit issued by the depositary institution is (are) enclosed / Le(s) récépissé(s) de dépôt délivré(s) par l'autorité de dépôt est (sont) ci-joint(s)</p> <p>wird (werden) nachgereicht / will be filed at a later date / sera (seront) produit(s) ultérieurement</p>	<div style="border: 1px solid black; padding: 5px;"> 20 <input type="checkbox"/> </div> <div style="border: 1px solid black; padding: 5px;"> 21 <input type="checkbox"/> Nummer Number Numéro </div> <div style="border: 1px solid black; padding: 5px;"> 22 <input type="checkbox"/> </div> <div style="border: 1px solid black; padding: 5px;"> 23 <input checked="" type="checkbox"/> </div> <div style="border: 1px solid black; padding: 5px;"> 24 <b>Printing Press</b> </div> <div style="border: 1px solid black; padding: 5px;"> 25 <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 33%;">Staat / State / Etat</th> <th style="width: 33%;">Anmeldetag / Filing date / Date de dépôt</th> <th style="width: 33%;">Aktenzeichen / Application No. / N° de la demande</th> </tr> <tr> <td>1 <b>US</b></td> <td><b>02.10.1995</b></td> <td><b>08/538,422</b> ✓</td> </tr> <tr> <td>2</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> </tr> </table> </div> <div style="border: 1px solid black; padding: 5px;"> 26 <b>MICRO-ORGANISMES</b>   L'invention concerne un (plusieurs) micro-organisme(s) et/ou utilise un (plusieurs) micro-organisme(s), déposé(s) afin de satisfaire aux conditions d'exposé de l'invention prévues à l'article 83 ensemble la règle 28, à cet effet, le dépôt a été effectué auprès d'une autorité habilitée au sens de la règle 28(1) a), en vertu soit du Traité de Budapest, soit d'un accord bilatéral entre l'autorité et l'OEB </div> <div style="border: 1px solid black; padding: 5px;"> 27 <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">Seite(n) / page(s)</th> <th style="width: 50%;">Zeile(n) / line(s) / ligne(s)</th> </tr> <tr> <td>28 <input type="checkbox"/></td> <td></td> </tr> <tr> <td>29 <input type="checkbox"/></td> <td></td> </tr> <tr> <td>30 <input type="checkbox"/></td> <td></td> </tr> </table> </div>	Staat / State / Etat	Anmeldetag / Filing date / Date de dépôt	Aktenzeichen / Application No. / N° de la demande	1 <b>US</b>	<b>02.10.1995</b>	<b>08/538,422</b> ✓	2			3			4			Seite(n) / page(s)	Zeile(n) / line(s) / ligne(s)	28 <input type="checkbox"/>		29 <input type="checkbox"/>		30 <input type="checkbox"/>	
Staat / State / Etat	Anmeldetag / Filing date / Date de dépôt	Aktenzeichen / Application No. / N° de la demande																						
1 <b>US</b>	<b>02.10.1995</b>	<b>08/538,422</b> ✓																						
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30 <input type="checkbox"/>																								

**NUCLEOTID-UND AMINOSÄURESEQUENZEN / NUCLEOTIDE AND AMINO ACID SEQUENCES / SEQUENCES DE NUCLEOTIDES ET D'ACIDES AMINES**

SEQ (1)

Die Beschreibung enthält ein Sequenzprotokoll nach Regel 27a(1) / The description contains a sequence listing in accordance with Rule 27a(1) / La description contient une liste de séquences selon la règle 27bis(1)

Der vorgeschriebene maschinenlesbare Datenträger ist beigelegt / The prescribed machine readable data carrier is enclosed / Le support de données prescrit déchiffirable par machine est annexé

Es wird hiermit erklärt, daß die auf dem Datenträger gespeicherte Information mit dem schriftlichen Sequenzprotokoll übereinstimmt (Regel 27a(2)) / It is hereby stated that the information recorded on the data carrier is identical to the written sequence listing (Rule 27a(2)) / Il est déclaré par la présente que l'information figurant sur le support de données est identique à celle que contient la liste de séquences écrite (règle 27bis (2))

**Verschiedene Anmelder für verschiedene Vertragsstaaten / Different applicants for different Contracting States / Différents demandeurs pour différents Etats contractants**

APPR 02 #

**BENENNUUNG VON VERTRAGSSTAATEN / DESIGNATION OF CONTRACTING STATES / DESIGNATION D'ETATS CONTRACTANTS**

DEST

Österreich / Austria / Autriche

AT

Belgien / Belgium / Belgique

BE

Schweiz und Liechtenstein / Switzerland and Liechtenstein / Suisse et Liechtenstein

CH / LI

Deutschland / Germany / Allemagne

DE

Danemark / Denmark / Danemark

DK

Spanien / Spain / Espagne

ES

Frankreich / France / France

FR

Vereinigtes Königreich / United Kingdom / Royaume-Uni

GB

Griechenland / Greece / Grèce

GR

Irland / Ireland / Irlande

IE

Italien / Italy / Italie

IT

Luxemburg / Luxembourg / Luxembourg

LU

Monaco / Monaco / Monaco

MC

Niederlande / Netherlands / Pays-Bas

NL

Portugal / Portugal / Portugal

PT

Schweden / Sweden / Suede

SE

FINLAND

FI

(Platz für Vertragsstaaten für die das EPU nach Drucklegung dieses Formblatts in Kraft tritt)

(Space for Contracting States for which the EPC enters into force after this form has been printed)

**VORSORGLICHE BENENNUUNG SAMTLICHER VERTRAGSSTAATEN**

Die in Feld 33 angegebenen Staaten sind jene, für die die Zahlung der Benennungsgebühren vorgenommen wurde oder derzeit beabsichtigt ist. Vorsorglich werden jedoch sämtliche Staaten benannt, die zum Zeitpunkt der Einreichung dieser Anmeldung Vertragsstaaten des EPU sind (1.10.1995 AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE). Es wird ersucht, die Benennung der hier zusätzlich benannten Vertragsstaaten als vom Anmelder zurückgenommen zu betrachten, wenn für diese Staaten die Benennungsgebühren nicht bis zum Ablauf der in Regel 85a(2) vorgesehenen Nachfrist entrichtet werden. Es wird beantrag, von der Zustellung einer Mitteilung nach Regel 85a(1) und einer Mitteilung nach Regel 69(1) betreffend die hier zusätzlich benannten Vertragsstaaten abzusehen.

**PRECAUTIONARY DESIGNATION OF ALL CONTRACTING STATES**

The States indicated in Section 33 are those for which it is at present intended to pay designation fees if these have not already been paid. As a precautionary measure, however, all those States which are Contracting States to the EPC at the time of filing this application are designated (1.10.1995 AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE). It is hereby requested that the designation of any additional States thereby included be regarded as withdrawn by the applicant if the designation fees have not been paid by the time the period of grace allowed in Rule 85a(2) expires. It is requested that no communication under Rule 85a(1) or any communication under Rule 69(1) concerning the additional Contracting States designated above be notified.

31

32

Name(n) des (der) Anmelder(s) und benannte Vertragsstaaten / Name(s) of applicant(s) and designated Contracting States / Nom(s) du (des) demandeur(s) et des Etats contractants désignés

33

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

(Prévu pour des Etats contractants à l'égard desquels la CBE entrera en vigueur après l'impression du présent formulaire)

33a

X

**DESIGNATION A TOUTES FINS UTILES DE TOUS LES ETATS CONTRACTANTS**

Les Etats indiqués à la rubrique 33 sont ceux pour lesquels le paiement des taxes de désignation a été effectué ou pour lesquels l'on se propose actuellement de payer les taxes de désignation. Toutefois, à toutes fins utiles, sont désignés tous les Etats qui sont des Etats contractants de la CBE à la date du dépôt de la demande (1.10.1995 AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE). Il est demandé, au cas où les taxes de désignation pour les Etats contractants désignés à titre complémentaire ne seraient pas acquittées dans le délai supplémentaire prévu à la règle 85bis(2), que la désignation desdits Etats soit considérée comme retirée par le demandeur. Prière de ne pas procéder pour lesdits Etats contractants désignés à titre complémentaire à la signification d'une notification établie conformément à la règle 85bis(1) ou à la règle 69(1).

# **ERSTRECKUNG DES EUROPÄISCHEN PATENTS**

Diese Anmeldung gilt als Antrag, die europäische Patentanmeldung und das darauf erteilte europäische Patent auf alle Nicht-Vertragsstaaten des EPU zu erstrecken, mit denen am Tag ihrer Einreichung „Erstreckungsabkommen“ bestehen (Derzeit: Litauen, Lettland, Slowenien). Die Erstreckung wird jedoch nur wirksam, wenn die vorgeschriebene Erstreckungsgebühr entrichtet wird.

## **EXTENSION OF THE EUROPEAN PATENT**

This application is deemed to be a request to extend the European patent application and the European patent granted in respect of it to all non-Contracting States to the EPC with which "extension agreements" exist on the date on which the application is filed (Present situation: Lithuania, Latvia, Slovenia). However, the extension only takes effect if the prescribed extension fee is paid.

EXPT

Der Anmelder beabsichtigt derzeit, die Erstreckungsgebühr für die nachfolgend angekreuzten Staaten zu entrichten: /  
The applicant currently intends to pay the extension fee for the States marked below with a cross: /  
Le demandeur se propose actuellement d'acquitter la taxe d'extension pour les Etats dont le nom est coché ci-après:

Litauen / Lithuania / Lituanie

LT

Lettland / Latvia / Lettonie

LV

Slowenien / Slovenia / Slovénie

SI

(Platz für Staaten, mit denen nach Drucklegung dieses Formblatts „Erstreckungsabkommen“ in Kraft treten) /  
(Space for States with which „extension agreements“ enter into force after this form has been printed) /  
(Prévu pour des Etats à l'égard desquels des «accords d'extension» entreront en vigueur après l'impression du présent formulaire)

Die Anmeldung ist eine Teilanmeldung /  
The application is a divisional  
application /  
La présente demande  
constitue une demande  
divisionnaire

DFIL 9

#

PANR

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Es handelt sich um eine Anmeldung nach Art. 61(1)(b) /  
The application is an Art. 61(1)(b)  
application /  
La présente demande  
constitue une demande  
selon l'article 61(1)(b)

DFIL 9

#

EANR

#

Patentansprüche / Claims / Revendications

CLMS

Weiterer Satz von Patentansprüchen (Art. 167(2)(a)) /  
Additional set of claims (Art. 167(2)(a)) /  
Série supplémentaire de revendications (art. 167(2)(a))

AUCL (1)

AUCL (3)

AUCL (4)

Zur Veröffentlichung mit der Zusammenfassung wird vorgeschlagen  
Abbildung Nr. 7 With the abstract it is proposed to publish  
figure No. 7 Il est proposé de publier avec l'abrégé  
la figure n°

DRAW (2)

Zusätzliche Abschrift(en) der im europäischen Recherchenbericht  
angeführten Schriftstücke wird (werden) beantragt / Additional copy(ies)  
of the documents cited in the European search report is (are) requested /  
Prière de fournir une (des) copie(s) supplémentaire(s) des  
documents cités dans le rapport de recherche européenne

ASOC

## **EXTENSION DES EFFETS DU BREVET EUROPEEN**

La présente demande est réputée constituer une requête en extension des effets de la demande de brevet européen et du brevet européen délivré sur la base de cette demande à tous les Etats non parties à la CBE avec lesquels il existe un «accord d'extension» à la date du dépôt de la demande (Situation actuelle: Lituanie, Lettonie, Slovénie). Toutefois l'extension ne produit ses effets que s'il est acquitté la taxe d'extension prescrite.

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Nummer der früheren Anmeldung  
No. of earlier application  
Numero de la demande initiale

Nummer der früheren Anmeldung  
No. of earlier application  
Numero de la demande initiale

Zahl der Patentansprüche  
Number of claims  
Nombre de revendications

AT

ES

GR

Zahl der Patentansprüche  
Number of claims  
Nombre de revendications

Nummer / Number / Numéro

Anzahl der **zusätzlichen** Sätze von Abschriften  
Number of **additional** sets of copies  
Nombre de jeux **supplémentaires** de copies

Es wird die Rückerstattung der Recherchegebühr gemäß Art. 10 GebO beantragt / Refund of the search fee is requested pursuant to Article 10 of the Rules relating to Fees / Le remboursement de la taxe de recherche est demandé en vertu de l'article 10 du règlement relatif aux taxes

Eine Kopie des Recherchenberichts ist beigelegt / A copy of the search report is attached / Une copie du rapport de recherche est jointe

**AUTOMATISCHER ABBUCHUNGSauftrag** (nur möglich für Inhaber von beim EPA geführten laufenden Konten)  
**AUTOMATIC DEBIT ORDER** (for EPO deposit account holders only)  
**ORDRE DE PRELEVEMENT AUTOMATIQUE** (uniquement possible pour les titulaires de comptes courants ouverts auprès de l'OEB)

Das Europäische Patentamt wird hiermit beauftragt, fällig werdende Gebühren und Auslagen nach Maßgabe der Vorschriften über das automatische Abbuchungsverfahren vom nebenstehenden laufenden Konto abzubuchen / The European Patent Office is hereby authorised, under the Arrangements for the automatic debiting procedure, to debit from the deposit account opposite any fees and costs falling due / Par la présente, il est demandé à l'Office européen des brevets de prélever du compte courant ci-contre les taxes et frais venant à échéance, conformément à la réglementation relative au prélèvement automatique

DECA

Eventuelle Rückzahlungen auf das nebenstehende beim EPA geführte laufende Konto / Reimbursement, if any, to EPO deposit account opposite / Remboursements éventuels à effectuer sur le compte courant ci-contre ouvert auprès de l'OEB

DEPA

Die vorgeschriebene Liste über die diesem Antrag beigelegten Unterlagen ergibt sich aus der vorbereiteten Empfangsbescheinigung (Seite 6 dieses Antrages)

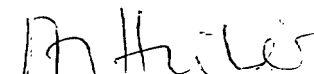
The prescribed list of documents enclosed with this request is shown on the prepared receipt (page 6 of this request)

Unterschrift(en) des (der) Anmelders(s) oder Vertreter(s) / Signature(s) of applicant(s) or representative(s) / Signature(s) du (des) demandeur(s) ou du (des) mandataire(s)

Ort / Place / Lieu Hamburg

Datum / Date 1. 10. 1996

**UEXKÜLL & STOLBERG**  
**(Association No. 1)**

  
**Arnulf Huber**

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Nummer des laufenden Kontos / Name des Kontoinhabers /  
 Deposit account number / Account holder's name /  
 Numéro du compte courant Nom du titulaire du compte

Nummer des laufenden Kontos / Name des Kontoinhabers /  
 Deposit account number / Account holder's name /  
 Numéro du compte courant Nom du titulaire du compte

**2800 0327** **UEXKÜLL & STOLBERG**

La liste prescrite des documents joints à cette requête figure sur le récépissé préétabli (page 6 de la présente requête)

Für Angestellte nach Artikel 133 (3) Satz 1 mit allgemeiner Vollmacht / For employees under Article 133 (3), 1st sentence, having a general authorisation / Pour les employés mentionnés à l'article 133, paragraphe 3, 1re phrase, munis d'un pouvoir général Nr. / No. / n°:

# Empfangsbescheinigung / Receipt for documents / Récépissé de documents 6

(Liste der diesem Antrag beigefügten Unterlagen)

(Checklist of enclosed documents)

(Liste des documents annexés à la présente requête)

Es wird hiermit der Empfang der unten bezeichneten Dokumente bescheinigt / Receipt of the documents indicated below is hereby acknowledged / Nous attestons le dépôt des documents désignés ci-dessous.

Wird im Falle der Einreichung der europäischen Patentanmeldung bei einer nationalen Behörde diese Empfangsbescheinigung vom Europäischen Patentamt übersandt, so ist sie als Mitteilung gemäß Regel 24(4) anzusehen (siehe Feld RENA). Nach Erhalt der Mitteilung nach Regel 24(4) sind alle weiteren Unterlagen, die die Anmeldung betreffen, nur noch unmittelbar beim EPA einzureichen. / If this receipt is issued by the European Patent Office and the European patent application was filed with a national authority it serves as a communication under Rule 24(4) (see Section RENA). Once the communication under Rule 24(4) has been received, all further documents relating to the application must be sent directly to the European Patent Office. / Si, en cas de dépôt de la demande de brevet européen auprès d'un service national, le Office européen des brevets délivre la présente récépissé de documents, ce récépissé est réputé être la notification visée à la règle 24(4). Dès que la notification visée à la règle 24(4) a été reçue, tous les autres documents relatifs à la demande doivent être adressés directement à l'OEB.

**UEXKÜLL & STOLBERG**  
Patentanwälte  
Beselerstr. 4

D-22607 Hamburg

Nur für amtlichen Gebrauch / For official use only / Cadre réservé à l'administration

Datum / Date

Europäisches Patentamt

GD 1 - Dienststelle Berlin

European Patent Office

GD 1 - Bureau principal de Berlin

Office Européen des Brevets

GD 1 - Agence de Berlin

Giltchiner Str. 103, D-10963 Berlin

☒ D-10958 Berlin

Unterschrift / Amtsstempel / Signature / Official stamp / Signature / Cachet officiel

Anmeldenummer / Application No. / N° de la demande	96250217.5
Tag des Eingangs (Regel 24(2)) / Date of receipt (Rule 24(2)) / Date de réception (règle 24(2))	DREC 02.10.1996
Zeichen des Anmelders/Vertreters / Applicant's/ Representative's ref / Reference du demandeur ou du mandataire	AREF P 44215
Nur nach Einreichung der Anmeldung bei einer nationalen Behörde / Only after filing of the application with a national authority / Seulement après le dépôt de la demande auprès d'un service national	
Tag des Eingangs beim EPA (Regel 24(4)) / Date of receipt at EPO (Rule 24(4)) / Date de réception à l'OEB (règle 24(4))	RENA

A. Anmeldungsunterlagen und Prioritätsbelege / Application documents and priority document(s) / Pièces de la demande et document(s) de priorité	47	Stückzahl / Number of copies / Nombre d'exemplaire	Blattzahl* eines Stücks / Number of sheets* in each copy / Nombre de "feuilles" par exemplaire	Gesamtzahl der Abbildungen / Total number of figures / Nombre total de figures
1 Beschreibung / Description		31	35	
2 Patentansprüche / Claim(s) / Revendication(s)		31	3433	
3 Ggf. unterschiedliche Patentansprüche (Art. 167(2) a) / Any different claims (Art. 167(2)a) / Le cas échéant, revendications différentes (art. 167(2) a))				
4 Zeichnung(en) / Drawing(s) / Dessin(s)		31	10	18 ✓
5 Zusammenfassung / Abstract / Abrege		31	1	
6 Übersetzung der Anmeldungsunterlagen / Translation of the application documents / Traduction des pièces de la demande				
7 Prioritätsbelege / Priority document(s) / Document(s) de priorité				
B. Der Anmeldung in der eingereichten Fassung liegen folgende Unterlagen bei: / This application as filed is accompanied by the items below: / A la présente demande sont annexées les pièces suivantes:				
1 Einzelvollmacht / Specific authorisation / Pouvoir particulier				
2 Allgemeine Vollmacht / General authorisation / Pouvoir general				
3 Erfindernennung / Designation of inventor / Designation de l'inventeur				
4 Früherer Recherchenbericht / Earlier search report / Rapport de recherche antérieure				
5 Gebührenzahlungsvordruck (EPA Form 1010) / Voucher for the settlement of fees (EPO Form 1010) / Bordereau de règlement de taxes (OEB Form 1010)				
6 Scheck (ausgeschlossen bei Einreichung bei den nationalen Behörden) / Cheque (not when filing with national authorities) / Cheque (pas de cheque en cas de dépôt auprès des services nationaux)				
7 Datenträger für Sequenzprotokoll / Data carrier for sequence listing / Support de données pour liste de séquences				
8 Zusatzblatt / Additional sheet / Feuille additionnelle				
9 Sonstige Unterlagen (bitte hier spezifizieren) / Other (please specify here) / Autres documents (veuillez préciser ici)				
C. Kopien dieser Empfangsbescheinigung / Copies of this receipt for documents / Copies du présent récépissé de documents	49	2	Anzahl der Kopien / Number of copies / Nombre de copies	

\* Die Richtigkeit der Angabe der Blattzahl wurde bei Eingang nicht geprüft / No check was made on receipt that the number of sheets indicated was correct / L'exactitude du nombre de feuilles n'a pas été contrôlée lors du dépôt

ERFINDERNENNUNG / DESIGNATION OF INVENTOR / DESIGNATION DE L'INVENTEUR

Nr. der Anmeldung / Application N° / N° de la demande

Zeichen des Vertreters  
Representative's Reference  
Référence du mandataire

P 44215

In Sachen der Europäischen Patentanmeldung (Bezeichnung der Erfindung)  
In respect of the European patent application (title of the invention)  
En ce qui concerne la demande de brevet européen (Titre de l'invention)

Printing Press

nennen die Unterzeichneten  
We, the undersigned  
les soussignés

UEXKÜLL & STOLBERG  
Patentanwälte  
Beselerstr. 4  
D-22607 HAMBURG

Zusammenschluß Nr. 1 / Association No. 1 / Groupement No. 1

als Erfinder:  
do hereby designate as inventor(s):  
désigne(nt) en tant qu'inventeur(s):

1. DeMoore, Howard  
10954 Shady Trail  
Dallas, Texas 75220  
U.S.A.
2. Rendleman, Ronald M.  
4331 Royal Ridge  
Dallas, Texas 75229  
U.S.A.
3. Bird, John W.  
1514 Iroquois Circle  
Carrollton, Texas 75007  
U.S.A.

(Weitere Erfinder sind auf einem gesonderten Blatt angegeben)  
☐ (Additional inventors indicated on supplementary sheet)  
(les autres inventeurs sont mentionnés sur une feuille supplémentaire)

Erklärung darüber, wie der (die) Anmelder das Recht auf das Europäische Patent erlangt hat (haben):  
Statement indicating the origin of right to the European patent:  
Déclaration indiquant l'origine de l'acquisition du droit au brevet:

Assignment dated September 11, 1995

Ort / Place / Lieu HAMBURG

Datum / Date 28. 9. 1996

Unterschrift des Vertreters  
Signature of Representative  
Signature du mandataire

UEXKÜLL & STOLBERG

  
Arnulf Huber

Zusammenschluß Nr. 1 / Association No. 1 / Groupement N° 1





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1 gripper fingers which grip and pull freshly printed sheets from  
2 the last impression cylinder and convey the sheets to the sheet  
3 delivery stacker.

4 . Since the inks used with sheet fed rotary offset  
5 printing presses are typically wet and tacky, special precautions  
6 must be taken to prevent marking and smearing of the freshly  
7 printed or coated sheets as the sheets are transferred from one  
8 printing unit to another. The printed ink on the surface of the  
9 sheet dries relatively slowly and is easily smeared during subse-  
10 quent transfer between printing units. Marking, smearing and  
11 smudging can be prevented by a vacuum assisted sheet transfer  
12 apparatus as described in the following U.S. Patents: 5,113,255;  
13 5,127,329; 5,205,217; 5,228,391; 5,243,909; and 5,419,254, all to  
14 Howard W. DeMoore, co-inventor, and manufactured and sold by  
15 Printing Research, Inc. of Dallas, Texas, U.S.A. under its  
16 trademark BACVAC™.

17 In some printing jobs, offsetting is prevented by  
18 applying a protective and/or decorative coating material over all  
19 or a portion of the freshly printed sheets. Some coatings are  
20 formed of a UV-curable or water-dispersed resin applied as a  
21 liquid solution over the freshly printed sheets to protect the ink  
22 from offsetting or set-off and improve the appearance of the  
23 freshly printed sheets. Such coatings are particularly desirable  
24 when decorative or protective finishes are applied in the printing  
25 of posters, record jackets, brochures, magazines, folding cartons  
26 and the like.

#### 27 Description of the Prior Art

28 Various arrangements have been made for applying the  
29 coating as an in-line printing operation by using the last  
30 printing unit of the press as the coating application unit. For  
31 example, U.S. Patents 4,270,483; 4,685,414; and 4,779,557 disclose  
32 coating apparatus which can be moved into position to permit the  
33 blanket cylinder of the last printing unit of a printing press to  
34 be used to apply a coating material over the freshly printed

1 sheets. In U.S. Patent 4,841,903 (Bird) there are disclosed  
2 coating apparatus which can be selectively moved between the plate  
3 cylinder or the blanket cylinder of the last printing unit of the  
4 press so the last printing unit can only be used for coating  
5 purposes. However, when coating apparatus of these types are  
6 being used, the last printing unit cannot be used to print ink to  
7 the sheets, but rather can only be used for the coating operation.  
8 Thus, while coating with this type of in-line coating apparatus,  
9 the printing press loses the capability of printing on the last  
10 printing unit as it is converted to a coating unit.

11 The coater of U.S. Patent 5,107,790 (Sliker et al) is  
12 retractable along an inclined rail for extending and retracting a  
13 coater head into engagement with a blanket on the blanket  
14 cylinder. Because of its size, the rail-retractable coater can  
15 only be installed between the last printing unit of the press and  
16 the delivery sheet stacker, and cannot be used for interunit  
17 coating. The coater of U.S. Patent 4,615,293 (Jahn) provides two  
18 separate, independent coaters located on the dampener side of a  
19 converted printing unit for applying lacquer to a plate and to a  
20 rubber blanket. Consequently, although a plate and blanket are  
21 provided, the coating unit of Jahn's press is restricted to a  
22 dedicated coating operation only.

23 Proposals have been made for overcoming the loss of a  
24 printing unit when in-line coating is used, for example as set  
25 forth in U.S. Patent 5,176,077 to Howard W. DeMoore (co-inventor  
26 and assignee), which discloses a coating apparatus having an  
27 applicator roller positioned to apply the coating material to the  
28 freshly printed sheet while the sheet is still on the last  
29 impression cylinder of the press. This allows the last printing  
30 unit to print and coat simultaneously, so that no loss of printing  
31 unit capability results.

32 Some conventional coaters are rail-mounted and occupy a  
33 large amount of press space and reduce access to the press.  
34 Elaborate equipment is needed for retracting such coaters from the

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1 operative coating position to the inoperative position, which  
2 reduces access to the printing unit.

3 Accordingly, there is a need for an in-line ink-  
4 ing/coating apparatus which does not result in the loss of a  
5 printing unit, does not extend the length of the press, and which  
6 can print and coat aqueous and flexographic inks and coating  
7 materials simultaneously onto the plate and blanket on any litho-  
8 graphic printing unit of any lithographic printing press,  
9 including the first printing unit.

#### 10 Objects of the Invention

11 Accordingly, a general object of the present invention  
12 is to provide improved inking/coating apparatus which is capable  
13 of selectively applying ink or coating material to a plate on a  
14 plate cylinder or ink or coating material to a plate or blanket on  
15 a blanket cylinder.

16 A specific object of the present invention is to provide  
17 improved inking/coating apparatus of the character described which  
18 is extendable into inking/coating engagement with either a plate  
19 on a plate cylinder or to a plate or blanket on a blanket  
20 cylinder.

21 A related object of the present invention is to provide  
22 improved inking/coating apparatus of the character described which  
23 is capable of being mounted on any lithographic printing unit of  
24 the press and does not interfere with operator access to the plate  
25 cylinder, blanket cylinder, or adjacent printing units.

26 Another object of the present invention is to provide  
27 improved inking/coating apparatus of the character described,  
28 which can be moved from an operative inking/coating engagement  
29 position adjacent to a plate cylinder or a blanket cylinder to a  
30 non-operative, retracted position.

31 Still another object of the present invention is to  
32 provide improved inking/coating apparatus of the character  
33 described, which can be used for applying aqueous, flexographic  
34 and ultra-violet curable inks and/or coatings in combination with

1 lithographic, flexographic and waterless printing processes on any  
2 rotary offset printing press.

3 A related object of the present invention is to provide  
4 improved inking/coating apparatus of the character described,  
5 which is capable of applying aqueous or flexographic ink or  
6 coating material on one printing unit, for example the first  
7 printing unit, and drying the ink or coating material before it is  
8 printed or coated on the next printing unit so that it can be  
9 overprinted or overcoated immediately on the next printing unit  
10 with waterless, aqueous, flexographic or lithographic inks or  
11 coating materials.

12 Yet another object of the present invention is to  
13 provide improved inking/coating apparatus for use on a multiple  
14 color rotary offset printing press that can apply ink or coating  
15 material separately and/or simultaneously to the plate and/or  
16 blanket of a printing unit of the press from a single operative  
17 position, and from a single inking/coating apparatus.

18 A related object of the present invention is to provide  
19 improved inking/coating apparatus of the character described, in  
20 which virtually no printing unit adjustment or alteration is  
21 required when the inking/coating apparatus is converted from plate  
22 to blanket printing or coating and vice versa.

23 Another object of the present invention is to provide  
24 improved inking/coating apparatus that can be operably mounted in  
25 the dampener space of any lithographic printing unit for ink-  
26 ing/coating engagement with either a plate on a plate cylinder or  
27 a plate or blanket on a blanket cylinder, and which does not  
28 interfere with operator movement or activities in the interunit  
29 space between printing units.

### 30 Summary of the Invention

31 The foregoing objects are achieved by a retractable, in-  
32 line inking/coating apparatus which is mounted on the dampener  
33 side of any printing unit of a rotary offset press for movement  
34 between an operative (on-impression) inking/coating position and

1 a retracted, disengaged (off-impression) position. The ink-  
2 ing/coating apparatus includes an applicator roller which is  
3 movable into and out of engagement with a plate on a plate  
4 cylinder or a blanket on a blanket cylinder. The inking/coating  
5 applicator head is pivotally coupled to a printing unit by pivot  
6 pins which are mounted on the press side frames in the traditional  
7 dampener space of the printing unit in parallel alignment with the  
8 plate cylinder and the blanket cylinder. This dampener space  
9 mounting arrangement allows the inking/coating unit to be  
10 installed between any adjacent printing units on the press.

11 In the preferred embodiment, the applicator head  
12 includes vertically spaced pairs of cradle members with one cradle  
13 pair being adapted for supporting an inking/coating applicator  
14 roller in alignment with a plate cylinder, and the other cradle  
15 pair supporting an inking/coating applicator roller in alignment  
16 with the blanket cylinder, respectively, when the applicator head  
17 is in the operative position. Because of the pivotal support  
18 provided by the pivot pins, the applicator head can be extended  
19 and retracted within the limited space available in the tradition-  
20 al dampener space, without restricting operator access to the  
21 printing unit cylinders and without causing a printing unit to  
22 lose its printing capability.

When the inking/coating apparatus is used in combination with a flexographic printing plate and aqueous or flexographic ink or coating material, the water component of the aqueous or flexographic ink or coating material on the freshly printed or coated sheet is evaporated and dried by a high velocity, hot air interunit dryer and a high volume heat and moisture extractor assembly so that the freshly printed ink or coating material is dry before the sheet is printed or coated on the next printing unit. This quick drying process permits a base layer or film of ink, for example opaque white or metallic (gold, silver or other metallics) ink to be printed on the first printing unit, and then overprinted on the next printing unit without back-trapping or dot gain.

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1           The construction and operation of the present invention  
2 will be understood from the following detailed description taken  
3 in conjunction with the accompanying drawings which disclose, by  
4 way of example, the principles and advantages of the present  
5 invention.

6       Brief Description of the Drawings

7           FIGURE 1 is a perspective view of a sheet fed, rotary  
8 offset printing press having inking/coating apparatus embodying  
9 the present invention;

10          FIGURE 2 is a simplified perspective view of the single  
11 head, dual cradle inking/coating apparatus of the present  
12 invention;

13          FIGURE 3 is a schematic side elevational view of the  
14 printing press of Figure 1 having single head, dual cradle ink-  
15 ing/coating apparatus installed in the traditional dampener  
16 position of the first, second and last printing units;

17          FIGURE 4 is a simplified side elevational view showing  
18 the single head, dual cradle inking/coating apparatus in the  
19 operative inking/coating position for simultaneously printing on  
20 the printing plate and blanket on the fourth printing unit;

21          FIGURE 5 is a simplified side elevational view showing  
22 the single head, dual cradle inking/coating apparatus in the  
23 operative position for spot or overall inking or coating on the  
24 blanket of the first printing unit, and showing the dual cradle  
25 inking/coating apparatus in the operative position for spot or  
26 overall inking or coating on the printing plate of the second  
27 printing unit;

28          FIGURE 6 is a simplified side elevational view of the  
29 single head, dual cradle inking/coating apparatus of FIGURE 4 and  
30 FIGURE 5, partially broken away, showing the single head, dual  
31 cradle inking/coating apparatus in the operative coating position  
32 and having a sealed doctor blade reservoir assembly for spot or  
33 overall coating on the blanket;

FIGURE 7

1           FIGURE 7 is a schematic view showing a heat exchanger  
2 and pump assembly connected to the single head, dual cradle  
3 inking/coating apparatus for circulating temperature controlled  
4 ink or coating material to the inking/coating apparatus;

5           FIGURE 8 is a side elevational view, partially broken  
6 away, and similar to FIGURE 6 which illustrates an alternative  
7 coating head arrangement;

8           FIGURE 9 is a simplified elevational view of a printing  
9 unit which illustrates pivotal coupling of the inking/coating  
10 apparatus on the printing unit side frame members;

11           FIGURE 10 is a view similar to FIGURE 2 in which a pair  
12 of split applicator rollers are mounted in the upper cradle and  
13 lower cradle, respectively;

14           FIGURE 11 is a side elevational view of a split applica-  
15 tor roller;

16           FIGURE 12 is a perspective view of a doctor blade  
17 reservoir which is centrally partitioned by a seal element;

18           FIGURE 13 is a sectional view showing sealing engagement  
19 of the split applicator roller against the partition seal element  
20 of FIGURE 12;

21           FIGURE 14 is a view similar to FIGURE 8 which illus-  
22 trates an alternative inking/coating embodiment;

23           FIGURE 15 is a simplified side elevational view of a  
24 substrate which has a bronzed-like finish which is applied by  
25 simultaneous operation of the dual applicator roller embodiment of  
26 FIGURE 14;

27           FIGURE 16 is a side elevational view, partly in section,  
28 of a pan roller having separate transfer surfaces mounted on a  
29 split fountain pan;

30           FIGURE 17 is a simplified side elevational view of the  
31 dual cradle inking/coating apparatus, partially broken away, which  
32 illustrates an alternative inking/coating head apparatus featuring  
33 a single doctor blade assembly, anilox applicator roller mounted  
34 on the lower cradle; and



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1           FIGURE 18 is a side elevational view, partly in section,  
2 of a single doctor blade anilox applicator roller assembly having  
3 separate transfer surfaces, and a split fountain pan having  
4 separate fountain compartments, with the separate fountain  
5 compartments being supplied with different inks or coating  
6 materials from separate off-press sources.

7           Detailed Description of the Preferred Embodiments

8           As used herein, the term "processed" refers to printing  
9 and coating methods which can be applied to either side of a  
10 substrate, including the application of lithographic, waterless,  
11 UV-curable, aqueous and flexographic inks and/or coatings. The  
12 term "substrate" refers to sheet and web material. Also, as used  
13 herein, the term "waterless printing plate" refers to a printing  
14 plate having image areas and non-image areas which are oleophilic  
15 and oleophobic, respectively. "Waterless printing ink" refers to  
16 an oil-based ink which does not contain a significant aqueous  
17 component. "Flexographic plate" refers to a flexible printing  
18 plate having a relief surface which is wettable by flexographic  
19 ink or coating material. "Flexographic printing ink or coating  
20 material" refers to an ink or coating material having a base  
21 constituent of either water, solvent or UV-curable liquid. "UV-  
22 curable lithographic printing ink and coating material" refers to  
23 oil-based printing inks and coating materials that can be cured  
24 (dried) photomechanically by exposure to ultraviolet radiation,  
25 and that have a semi-paste or gel-like consistency. "Aqueous  
26 printing ink or coating material" refers to an ink or coating  
27 material that predominantly contains water as a solvent, diluent  
28 or vehicle. A "relief plate" refers to a printing plate having  
29 image areas which are raised relative to non-image areas which are  
30 recessed.

31           As shown in the exemplary drawings, the present  
32 invention is embodied in a new and improved in-line inking/coating  
33 apparatus, herein generally designated 10, for applying aqueous,  
34 flexographic or UV-curable inks or protective and/or decorative

FIGURE 1

1 coatings to sheets or webs printed in a sheet-fed or web-fed,  
2 rotary offset printing press, herein generally designated 12. In  
3 this instance, as shown in FIGURE 1, the inking/coating apparatus  
4 10 is installed in a four unit rotary offset printing press 12,  
5 such as that manufactured by Heidelberger Druckmaschinen AG of  
6 Germany under its designation Heidelberg Speedmaster SM102 (40",  
7 102cm).

8 The press 12 includes a press frame 14 coupled at one  
9 end, herein the right end, to a sheet feeder 16 from which sheets,  
10 herein designated S, are individually and sequentially fed into  
11 the press, and at the opposite end, with a sheet delivery stacker  
12 20 in which the freshly printed sheets are collected and stacked.  
13 Interposed between the sheet feeder 16 and the sheet delivery  
14 stacker 20 are four substantially identical sheet printing units  
15 22, 24, 26 and 28 which can print four different colors onto the  
16 sheets as they are transferred through the press 12. The printing  
17 units are housed within printing towers T1, T2, T3 and T4 formed  
18 by side frame members 14, 15. Each printing tower has a delivery  
19 side 25 and a dampener side 27. A dampener space 29 is partially  
20 enclosed by the side frames on the dampener side of the printing  
21 unit.

22 As illustrated, the printing units 22, 24, 26 and 28 are  
23 substantially identical and of conventional design. The first  
24 printing unit 22 includes an in-feed transfer cylinder 30, a plate  
25 cylinder 32, a blanket cylinder 34 and an impression cylinder 36,  
26 all supported for rotation in parallel alignment between the press  
27 side frames 14, 15 which define printing unit towers T1, T2, T3  
28 and T4. Each of the first three printing units 22, 24 and 26 have  
29 a transfer cylinder 38 disposed to transfer the freshly printed  
30 sheets from the adjacent impression cylinder and transfer the  
31 freshly printed sheets to the next printing unit via an intermedi-  
32 ate transfer drum 40.

33 The last printing unit 28 includes a delivery cylinder  
34 42 mounted on a delivery shaft 43. The delivery cylinder 42  
35 supports the freshly printed sheet 18 as it is transferred from

1 the last impression cylinder 36 to a delivery conveyor system,  
 2 generally designated 44, which transfers the freshly printed sheet  
 3 to the sheet delivery stacker 20. To prevent smearing during  
 4 transfer, a flexible covering is mounted on the delivery cylinder  
 5 42, as described and claimed in U.S. Patent 4,402,267 to Howard W.  
 6 DeMoore, which is incorporated herein by reference. The flexible  
 7 covering is manufactured and sold by Printing Research, Inc. of  
 8 Dallas, Texas, U.S.A., under its trademark SUPER BLUE®. Optional-  
 9 ly, a vacuum-assisted sheet transfer assembly manufactured and  
 10 sold by Printing Research, Inc. of Dallas, Texas, U.S.A., under  
 11 its trademark BACVAC® can be substituted for the delivery transfer  
 12 cylinder 42 and flexible covering.

13 The delivery conveyor system 44 as shown in FIGURE 2 is  
 14 of conventional design and includes a pair of endless delivery  
 15 gripper chains 46, only one of which is shown carrying at regular  
 16 spaced locations along the chains, laterally disposed gripper bars  
 17 having gripper fingers used to grip the leading edge of a freshly  
 18 printed or coated sheet 18 after it leaves the nip between the  
 19 impression cylinder 36 and delivery cylinder 42 of the last  
 20 printing unit 28. As the leading edge is gripped by the gripper  
 21 fingers, the delivery chains 46 pull the sheet away from the last  
 22 impression cylinder 36 and convey the freshly printed or coated  
 23 sheet to the sheet delivery stacker 20.

24 Prior to reaching the delivery sheet stacker, the  
 25 freshly printed and/or coated sheets S pass under a delivery dryer  
 26 48 which includes a combination of infra-red thermal radiation,  
 27 high velocity hot air flow and a high performance heat and  
 28 moisture extractor for drying the ink and/or the protec-  
 29 tive/decorative coating. Preferably, the delivery dryer 48,  
 30 including the high performance heat and moisture extractor is  
 31 constructed as described in U.S. Application Serial Number  
 32 08/116,711, filed September 3, 1993, entitled "Infra-Red Forced  
 33 Air Dryer and Extractor" by Howard C. Secor, Ronald M. Rendleman  
 34 and Paul D. Copenhaver, commonly assigned to the assignee of the  
 35 present invention, Howard W. DeMoore, and licensed to Printing

1 Research, Inc. of Dallas, Texas, U.S.A., which manufactures and  
2 markets the delivery dryer 48 under its trademark AIR BLANKET™.

3 In the exemplary embodiment shown in FIGURE 3, the first  
4 printing unit 22 has a flexographic printing plate PF mounted on  
5 the plate cylinder, and therefore neither an inking roller train  
6 nor a dampening system is required. A flexographic printing plate  
7 PF is also mounted on the plate cylinder of the second printing  
8 unit 24. The form rollers of the inking roller train 52 shown  
9 mounted on the second printing unit 24 are retracted and locked  
10 off to prevent plate contact. Flexographic ink is supplied to the  
11 flexographic plate PF of the second printing unit 24 by the ink-  
12 ing/coating apparatus 10.

13 A suitable flexographic printing plate PF is offered by  
14 E.I. du Pont de Nemours of Wilmington, Delaware, U.S.A., under its  
15 trademark CYREL®. Another source is BASF Aktiengesellschaft of  
16 Ludwigshafen, Germany, which offers a suitable flexographic  
17 printing plate under its trademark NYLOFLEX®.

18 The third printing unit 26 as illustrated in FIGURE 3  
19 and FIGURE 4 is equipped for lithographic printing and includes an  
20 inking apparatus 50 having an inking roller train 52 arranged to  
21 transfer ink Q from an ink fountain 54 to a lithographic plate P  
22 mounted on the plate cylinder 32. This is accomplished by a  
23 fountain roller 56 and a ductor roller 57. The fountain roller 56  
24 projects into the ink fountain 54, whereupon its surface picks up  
25 ink. The lithographic printing ink Q is transferred from the  
26 fountain roller 56 to the inking roller train 52 by the ductor  
27 roller 57. The inking roller train 52 supplies ink Q to the image  
28 areas of the lithographic printing plate P.

29 The lithographic printing ink Q is transferred from the  
30 lithographic printing plate P to an ink receptive blanket B which  
31 is mounted on the blanket cylinder 34. The inked image carried on  
32 the blanket B is transferred to a substrate S as the substrate is  
33 transferred through the nip between the blanket cylinder 34 and  
34 the impression cylinder 36.

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1           The inking roller arrangement 52 illustrated in FIGURE  
2 3 and FIGURE 4 is exemplary for use in combination with litho-  
3 graphic ink printing plates P. It is understood that a dampening  
4 system 58 having a dampening fluid reservoir DF is coupled to the  
5 inking roller train 52 (FIGURE 4), but is not required for water-  
6 less or flexographic printing.

7           The plate cylinder 32 of printing unit 28 is equipped  
8 with a waterless printing plate PW. Waterless printing plates are  
9 also referred to as dry planographic printing plates and are  
10 disclosed in the following U.S. patents: 3,910,187; Re. 30,670;  
11 4,086,093; and 4,853,313. Suitable waterless printing plates can  
12 be obtained from Toray Industries, Inc. of Tokyo, Japan. A  
13 dampening system is not used for waterless printing, and waterless  
14 (oil-based) printing ink is used. The waterless printing plate PW  
15 has image areas and non-image areas which are oleophilic/hydro-  
16 philic and oleophobic/hydrophobic, respectively. The waterless  
17 printing plate PW is engraved or etched, with the image areas  
18 being recessed with respect to the non-image areas. The image  
19 area of the waterless printing plate PW is rolled-up with the  
20 flexographic or aqueous printing ink which is transferred by the  
21 applicator roller 66. Both aqueous and oil-based inks and  
22 coatings are repelled from the non-image areas, and are retained  
23 in the image areas. The printing ink or coating is then trans-  
24 ferred from the image areas to an ink or coating receptive blanket  
25 B and is printed or coated onto a substrate S.

26           For some printing jobs, a flexographic plate PF or a  
27 waterless printing plate PW is mounted over a resilient packing  
28 such as the blanket B on the blanket cylinder 34, for example as  
29 indicated by phantom lines in printing unit 22 of FIGURE 5. An  
30 advantage of this alternative embodiment is that the waterless  
31 plate PW or the flexographic plate PF are resiliently supported  
32 over the blanket cylinder by the underlying blanket B or other  
33 resilient packing. The radial deflection and give of the  
34 resilient blanket B provides uniform, positive engagement between

1 the applicator roller 66 and a flexographic plate or waterless  
2 plate.

3 In that arrangement, a plate is not mounted on the plate  
4 cylinder 32; instead, a waterless plate PW is mounted on the  
5 blanket cylinder, and the inked image on the waterless printing  
6 plate is not offset but is instead transferred directly from the  
7 waterless printing plate PW to the substrate S. The water  
8 component of flexographic ink on the freshly printed sheet is  
9 evaporated by high velocity, hot air dryers and high volume heat  
10 and moisture extractors so that the freshly printed aqueous or  
11 flexographic ink is dried before the substrate is printed on the  
12 next printing unit.

13 Referring now to FIGURE 2, FIGURE 3 and FIGURE 9, the  
14 inking/coating apparatus 10 is pivotally mounted on the side  
15 frames 14, 15 for rotation about an axis X. The inking/coating  
16 apparatus 10 includes a frame 60, a hydraulic motor 62, a lower  
17 gear train 64, an upper gear train 65, an applicator roller 66, a  
18 sealed doctor blade assembly 68 (FIGURE 6), and a drip pan DP, all  
19 mounted on the frame 60. The external peripheral surface of the  
20 applicator roller 66 is wetted by contact with liquid coating  
21 material or ink contained in a reservoir 70.

22 The hydraulic motor 62 drives the applicator roller 66  
23 synchronously with the plate cylinder 32 and the blanket cylinder  
24 34 in response to an RPM control signal from the press drive (not  
25 illustrated) and a feedback signal developed by a tachometer 72.  
26 While a hydraulic drive motor is preferred, other drive means such  
27 as an electric drive motor or an equivalent can be used.

28 When using waterless printing plate systems, the  
29 temperature of the waterless printing ink and of the waterless  
30 printing plate must be closely controlled for good image reproduc-  
31 tion. For example, for waterless offset printing with TORAY  
32 waterless printing plates PW, it is absolutely necessary to  
33 control the waterless printing plate surface and waterless ink  
34 temperature to a very narrow range, for example 24°C (75°F) to  
35 27°C (80°F).

1 Referring to FIGURE 7, the reservoir 70 is supplied with  
2 ink or coating which is temperature controlled by a heat exchanger  
3 71. The temperature controlled ink or coating material is  
4 circulated by a positive displacement pump, for example a  
5 peristaltic pump, through the reservoir 70 and heat exchanger 71  
6 from a source 73 through a supply conduit 75 and a return conduit  
7 77. The heat exchanger 71 cools or heats the ink or coating  
8 material and maintains the ink or coating and the printing plate  
9 within the desired narrow temperature range.

10 According to one aspect of the present invention,  
11 aqueous/flexographic ink or coating material is supplied to the  
12 applicator roller 66, which transfers the aqueous/flexographic ink  
13 or coating material to the printing plate (FIGURE 7), which may be  
14 a waterless printing plate or a flexographic printing plate. When  
15 the inking/coating apparatus is used for applying aqueous/flexo-  
16 graphic ink or coating material to a waterless printing plate PW,  
17 the inking roller train 52 is not required, and is retracted away  
18 from the printing plate. Because the viscosity of aqueous/flexo-  
19 graphic printing ink or coating material varies with temperature,  
20 it is necessary to heat or cool the aqueous/flexographic printing  
21 ink or coating material to compensate for ambient temperature  
22 variations to maintain the ink viscosity in a preferred operating  
23 range.

24 For example, the temperature of the printing press can  
25 vary from around 60°F (15°C) in the morning, to around 85°F (29°C)  
26 or more in the afternoon. The viscosity of aqueous/flexographic  
27 printing ink or coating material can be marginally high when the  
28 ambient temperature of the press is near 60°F (15°C), and the  
29 viscosity can be marginally low when the ambient temperature of  
30 the press exceeds 85°F (29°C). Consequently, it is desirable to  
31 control the temperature of the aqueous/flexographic printing ink  
32 or coating material so that it will maintain the surface tempera-  
33 ture of waterless printing plates within the specified temperature  
34 range. Moreover, the ink/coating material temperature should be  
35 controlled to maintain the tack of the aqueous/flexographic

1 printing ink or coating material within a desired range when the  
2 ink or coating material is being used in connection with flexo-  
3 graphic printing processes.

4 The applicator roller 66 is preferably an anilox fluid  
5 metering roller which transfers measured amounts of printing ink  
6 or coating material to a plate or blanket. The surface of an  
7 anilox roller is engraved with an array of closely spaced, shallow  
8 depressions referred as "cells". Ink or coating from the  
9 reservoir 70 flows into the cells as the anilox roller turns  
10 through the reservoir. The transfer surface of the anilox roller  
11 is "doctored" (wiped or scraped) by dual doctor blades 68A, 68B to  
12 remove excess ink or coating material. The ink or coating metered  
13 by the anilox roller is that contained within the cells. The dual  
14 doctor blades 68A, 68B also seal the supply reservoir 70.

15 The anilox applicator roller 66 is cylindrical and may  
16 be constructed in various diameters and lengths, containing cells  
17 of various sizes and shapes. The volumetric capacity of an anilox  
18 roller is determined by cell size, shape and number of cells per  
19 unit area. Depending upon the intended application, the cell  
20 pattern may be fine (many small cells per unit area) or coarse  
21 (fewer large cells per unit area).

22 By supplying the ink or coating material through the  
23 inking/coating apparatus 10, more ink or coating material can be  
24 applied to the sheet S as compared with the inking roller train of  
25 a lithographic printing unit. Moreover, color intensity is  
26 stronger and more brilliant because the aqueous or flexographic  
27 ink or coating material is applied at a much heavier film  
28 thickness or weight than can be applied by the lithographic  
29 process, and the aqueous or flexographic colors are not diluted by  
30 dampening solution.

31 Preferably, the sealed doctor blade assembly 68 is con-  
32 structed as described in U.S. Patent 5,176,077 to Howard W.  
33 DeMoore, co-inventor and assignee, which is incorporated herein by  
34 reference. An advantage of using a sealed reservoir is that fast  
35 drying ink or coating material can be used. Fast drying ink or



1 coating material can be used in an open fountain 53 (see FIGURE  
2 8); however, open air exposure causes the water and solvents in  
3 the fast-drying ink or coating material to evaporate faster, thus  
4 causing the ink or coating material to dry prematurely and change  
5 viscosity. Moreover, an open fountain emits unwanted odors into  
6 the press room. When the sealed doctor blade assembly is  
7 utilized, the pump (FIGURE 7) which circulates ink or coating  
8 material to the doctor blade head is preferably a peristaltic  
9 pump, which does not inject air into the feeder lines which supply  
10 the ink or coating reservoir 70 and helps to prevent the formation  
11 of air bubbles and foam within the ink or coating material.

12 An inking/coating apparatus 10 having an alternative  
13 applicator roller arrangement is illustrated in FIGURES 10-13. In  
14 this arrangement, the engraved metering surface of the anilox  
15 applicator rollers 66, 67 are partitioned by smooth seal surfaces  
16 66C which separates a first engraved peripheral surface portion  
17 66A from a second engraved peripheral surface portion 66B.  
18 Likewise, smooth seal surfaces 66D, 66E are formed on the opposite  
19 end portions of the applicator roller 66 for engaging end seals  
20 134, 136 (FIGURE 12) of the doctor blade reservoir. The upper  
21 applicator roller 67 has engraved anilox metering surfaces 67A and  
22 67B which are separated by a smooth seal band 67C.

23 Referring now to FIGURE 12 and FIGURE 13, the reservoir  
24 70 of the doctor blade head 68 is partitioned by a curved seal  
25 element 130 to form two separate chambers 70A, 70B. The seal  
26 element 130 is secured to the doctor blade head within an annular  
27 groove 132. The seal element 130 is preferably made of polyur-  
28 ethane foam or other durable, resilient foam material. The seal  
29 element 130 is engaged by the seal band 66, thus forming a rotary  
30 seal which blocks the leakage of ink or coating material from one  
31 reservoir chamber into the other reservoir chamber. Moreover, the  
32 seal band provides an unprinted or uncoated area which separates  
33 the printed or coated areas from each other, which is needed for  
34 work and turn printing jobs or other printing jobs which print two  
35 or more separate images onto the same substrate.

1           Another advantage of the split applicator roller  
2           embodiment is that it enables two or more flexographic inks or  
3           coating materials to be printed simultaneously within the same  
4           lithographic printing unit. That is, the reservoir chambers 70A,  
5           70B of the upper doctor blade assembly can be supplied with gold  
6           ink and silver ink, for example, while the reservoir chambers 70A,  
7           70B of the lower doctor blade assembly can be supplied with inks  
8           of two additional colors, for example opaque white ink and blue  
9           ink. This permits the opaque white ink to be overprinted with the  
10          gold ink, and the blue ink to be overprinted with the silver ink  
11          on the same printing unit on any lithographic press.

12          Moreover, a catalyst can be used in the upper doctor  
13          blade reservoir and a reactive ink or coating material can be used  
14          in the lower doctor blade reservoir. This can provide various  
15          effects, for example improved chemical resistance and higher gloss  
16          levels.

17          The split applicator roller sections 67A, 67B in the  
18          upper cradle position can be used for applying two separate inks  
19          or coating materials simultaneously, for example flexographic,  
20          aqueous and ultra-violet curable inks or coating materials, to  
21          separate surface areas of the plate, while the lower applicator  
22          roller sections 66A, 66B can apply an initiator layer and a micro-  
23          encapsulated layer simultaneously to separate blanket surface  
24          areas. Optionally, the metering surface portions 66A, 66B can be  
25          provided with different cell metering capacities for providing  
26          different printing effects which are being printed simultaneously.  
27          For example, the screen line count on one half-section of an  
28          anilox applicator roller is preferably in the range of 200-600  
29          lines per inch (79-236 lines per cm) for half-tone images, and the  
30          screen line count of the other half-section is preferably in the  
31          range of 100-300 lines per inch (39-118 lines per cm) for overall  
32          coverage, high weight applications such as opaque white. This  
33          split arrangement in combination with dual applicator rollers is  
34          particularly advantageous when used in connection with "work and  
35          turn" printing jobs.

1 Referring again to FIGURE 8, instead of using the sealed  
2 doctor blade reservoir assembly 68 as shown in FIGURE 6, an open  
3 fountain assembly 69 is provided by the fountain pan 53 which  
4 contains a volume of liquid ink Q or coating material. The liquid  
5 ink or coating material is transferred to the applicator roller 66  
6 by a pan roller 55 which turns in contact with ink Q or coating  
7 material in the fountain pan. If a split applicator roller is  
8 used, the pan roller 55 is also split, and the pan is divided into  
9 two pan sections 53A, 53B by a separator plate 53P, as shown in  
10 FIGURE 16.

11 In the alternative embodiment of FIGURE 16, the pan  
12 roller 55 is divided into two pan roller sections 55A, 55B by a  
13 centrally located, annular groove 59. The separator plate 53P is  
14 received within and centrally aligned with the groove 59, but does  
15 not touch the adjoining roller faces. By this arrangement, two or  
16 more inks or coating materials Q1, Q2 are contained within the  
17 open pan sections 55A, 55B for transfer by the split pan roller  
18 sections 53A, 53B, respectively. This permits two or more  
19 flexographic inks or coating materials to be transferred to two  
20 separate image areas on the plate or on the blanket of the same  
21 printing unit. This arrangement is particularly advantageous for  
22 work and turn printing jobs or other printing jobs which print two  
23 or more separate images onto the same substrate.

The frame 60 of the inking/coating apparatus 10 includes side support members 74, 76 which support the applicator roller 66, gear train 64, gear train 65, doctor blade assembly 68 and the drive motor 62. The applicator roller 66 is mounted on stub shafts 63A, 63B which are supported at opposite ends on a lower cradle assembly 100 formed by a pair of side support members 78, 80 which have sockets 79, 81 and retainer caps 101, 103. The stub shafts are received in roller bearings 105, 107 which permit free rotation of the applicator roller 66 about its longitudinal axis A1 (axis A2 in the upper cradle). The retainer caps 101, 103 hold the stub shafts 63A, 63B and bearings 105, 107 in the sockets 79,

1 81 and hold the applicator roller 66 in parallel alignment with  
2 the pivot axis X.

3 The side support members 74, 76 also have an upper  
4 cradle assembly 102 formed by a pair of side support members 82,  
5 84 which are vertically spaced with respect to the lower side  
6 plates 78, 80. Each cradle 100, 102 has a pair of sockets 79, 81  
7 and 83, 85, respectively, for holding an applicator roller 66, 67  
8 for spot coating or inking engagement with the printing plate P on  
9 the plate cylinder 32 (FIGURE 4) or with a printing plate P or a  
10 blanket B on the blanket cylinder 34.

11                    Preferably, the applicator roller 67 (FIGURE 8, FIGURE  
12                    9) the upper cradle (plate) position is an anilox roller having a  
13                    resilient transfer surface. In the dual cradle arrangement as  
14                    shown in FIGURE 2, the press operator can quickly change from  
15                    blanket inking/coating to plate inking/coating within minutes,  
16                    since it is only necessary to release, remove and reposition or  
17                    replace the applicator roller 66.

18           The capability to simultaneously print in the flexo-  
19   graphic mode, the aqueous mode, the waterless mode, or the litho-  
20   graphic mode on different printing units of the same lithographic  
21   press and to print or coat from either the plate position or the  
22   blanket position on any one of the printing units is referred to  
23   herein as the LITHOFLEX™ printing process or system. LITHOFLEX™  
24   is a trademark of Printing Research, Inc. of Dallas, Texas,  
25   U.S.A., exclusive licensee of the present invention.

Referring now to FIGURE 14, an inking/coating apparatus 10 having an inking/coating assembly 109 of an alternative design is installed in the upper cradle position for applying ink and/or coating material to a plate P on the plate cylinder 32. According to this alternative embodiment, an applicator roller 67R having a resilient transfer surface is coupled to an anilox fluid metering roller which transfers measured amounts of printing ink or coating material to the plate P. The anilox roller 111 has a transfer surface constructed of metal, ceramic or composite material which is engraved with cells. The resilient applicator roller 67R is

interposed in transfer engagement with the plate P and the metering surface of the anilox roller 111. The resilient transfer surface of the applicator roller 67R provides uniform, positive engagement with the plate.

Referring now to FIGURE 17, an inking/coating apparatus 10 having an alternative inking/coating assembly 113 is installed in the lower cradle assembly 100 for applying flexographic or aqueous ink and/or coating material Q to a plate or blanket mounted on the blanket cylinder 34. Instead of using the sealed, dual doctor blade reservoir assembly 68 as shown in FIGURE 6, an open, single doctor blade anilox roller assembly 113 is supplied with liquid ink Q or coating material contained in an open fountain pan 117. The liquid ink or coating material Q is transferred to the engraved transfer surface of the anilox roller 66 as it turns in the fountain pan 117. Excess ink or coating material Q is removed from the engraved transfer surface by a single doctor blade 68B. The liquid ink or coating material Q is pumped from an off-press source, for example the drum 73 shown in FIGURE 17, through a supply conduit 119 into the fountain pan 117 by a pump 120.

For overall inking or coating jobs, the metering transfer surface of the anilox roller 66 extends over its entire peripheral surface. However, for certain printing jobs which print two or more separate images onto the same substrate, for example work and turn printing jobs, the metering transfer surface of the anilox applicator roller 66 is partitioned by a centrally located, annular undercut groove 66C which separates first and second metering transfer surfaces 66A, 66B as shown in FIGURE 11 and FIGURE 18.

The single doctor blade 68B has an edge 68E which wipes simultaneously against the split metering transfer surfaces 66A, 66B. In this single blade, split anilox roller embodiment 113, it is necessary to provide dual supply sources, for example drums 73A, 73B, dual supply lines 119A, 119B, and dual pumps 120A, 120B. Moreover, the fountain pan 117 is also split, and the pan 117 is

1 divided into two pan sections 117A, 117B by a separator plate 121,  
2 as shown in FIGURE 18. The separator plate 121 is centrally  
3 aligned with the undercut groove 66C, but does not touch the  
4 adjoining roller faces.

5 Although the single blade, split anilox applicator  
6 roller assembly 113 is shown mounted in the lower cradle position  
7 (FIGURE 17), it should be understood that the single blade, split  
8 anilox applicator roller assembly 113 can be mounted and used in  
9 the upper cradle position, as well.

10 According to another aspect of the present invention,  
11 the inking/coating apparatus 10 is pivotally coupled on horizontal  
12 pivot pins 88P, 90P which allows the single head, dual cradle ink-  
13 ing/coating apparatus 10 to be mounted on any lithographic  
14 printing unit. Referring to FIGURE 9, the horizontal pivot pins  
15 88P, 90P are mounted within the traditional dampener space 29 of  
16 the printing unit and are secured to the press side frames 14, 15,  
17 respectively. Preferably, the pivot support pins 88P, 90P are  
18 secured to the press side frames by a threaded fastener. The  
19 pivot support pins are received within circular openings 88, 90  
20 which intersect the side support members 74, 76 of the ink-  
21 ing/coating apparatus 10. The horizontal support pins 88P, 90P  
22 are disposed in parallel alignment with rotational axis X and with  
23 the plate cylinder and blanket cylinder, and are in longitudinal  
24 alignment with each other.

25 Preferably, the pivot pins 88P, 90P are located in the  
26 dampener space 29 so that the rotational axes A1, A2 of the  
27 applicator rollers 66, 67 are elevated with respect to the nip  
28 contact points N1, N2. By that arrangement, the transfer point  
29 between the applicator roller 66 and a blanket on the blanket  
30 cylinder 34 (as shown in FIGURE 8) and the transfer point between  
31 the applicator roller 66 and a plate on the plate cylinder 32 (as  
32 shown in FIGURE 5) are above the radius lines R1, R2 of the plate  
33 cylinder and the blanket cylinder, respectively. This permits the  
34 inking/coating apparatus 10 to move clockwise to retract the  
35 applicator roller 66 to an off-impression position relative to the

blanket cylinder in response to a single extension stroke of the power actuator arms 104A, 106A. Similarly, the applicator roller 66 is moved counterclockwise to the on-impression operative position, as shown in FIGURES 4, 5, 6 and 8 by a single retraction stroke of the actuator arms 104A, 106A, respectively.

Preferably, the pivot pins are made of steel and the side support members are made of aluminum, with the steel pivot pins and the aluminum collar portion bordering the circular openings 88, 90 forming a low friction journal. By this arrangement, the inking/coating apparatus 10 is freely rotatable clockwise and counterclockwise with respect to the pivot pins 88P, 90P. Typically, the arc length of rotation is approximately 60 mils (about 1.5 mm). Consequently, the inking/coating apparatus 10 is almost totally enclosed within the dampener space 29 of the printing unit in the on-impression position and in the off-impression position.

The cradle assemblies 100 and 102 position the applicator roller 66 in inking/coating alignment with the plate cylinder or blanket cylinder, respectively, when the inking/coating apparatus 10 is extended to the operative (on-impression) position. Moreover, because the inking/coating apparatus 10 is installed within the dampener space 29, it is capable of freely rotating through a small arc while extending and retracting without being obstructed by the press side frames or other parts of the printing press. This makes it possible to install the inking/coating apparatus 10 on any lithographic printing unit. Moreover, because of its internal mounting position within the dampener space 29, the projection of the inking/coating apparatus 10 into the space between printing units is minimal. This assures unrestricted operator access to the printing unit when the applicator head is in the operative (on-impression) and retracted (off-impression) positions.

As shown in FIGURE 4 and FIGURE 5, movement of the inking/coating apparatus 10 is counterclockwise from the retracted

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1 (off-impression) position to the operative (on-impression)  
2 position.

3 Although the dampener side installation is preferred,  
4 the inking/coating apparatus 10 can be adapted for operation on  
5 the delivery side of the printing unit, with the inking/coating  
6 apparatus being movable from a retracted (off-impression) position  
7 to an on-impression position for engagement of the applicator  
8 roller with either a plate on the plate cylinder or a blanket on  
9 the blanket cylinder on the delivery side 25 of the printing unit.

10 Movement of the inking/coating apparatus 10 to the  
11 operative (on-impression) position is produced by power actuators,  
12 preferably double acting pneumatic cylinders 104, 106 which have  
13 extendable/retractable power transfer arms 104A, 106A, respective-  
14 ly. The first pneumatic cylinder 104 is pivotally coupled to the  
15 press frame 14 by a pivot pin 108, and the second pneumatic  
16 cylinder 106 is pivotally coupled to the press frame 15 by a pivot  
17 pin 110. In response to selective actuation of the pneumatic  
18 cylinders 104, 106, the power transfer arms 104A, 106A are  
19 extended or retracted. The power transfer arm 104A is pivotally  
20 coupled to the side support member 74 by a pivot pin 112.  
21 Likewise, the power transfer arm 106A is pivotally coupled to the  
22 side support member 76 by a pivot pin 114.

23 As the power arms extend, the inking/coating apparatus  
24 10 is rotated clockwise on the pivot pins 88P, 90P, thus moving  
25 the applicator roller 66 to the off-impression position. As the  
26 power arms retract, the inking/coater apparatus 60 is rotated  
27 counterclockwise on the pivot pins 88P, 90P, thus moving the  
28 applicator roller 66 to the on-impression position. The torque  
29 applied by the pneumatic actuators is transmitted to the ink-  
30 ing/coating apparatus 10 through the pivot pin 112 and pivot pin  
31 114.

32 Fine adjustment of the on-impression position of the  
33 applicator roller relative to the plate cylinder or the blanket  
34 cylinder, and of the pressure of roller engagement, is provided by  
35 an adjustable stop assembly 115. The adjustable stop assembly 115



1 has a threaded bolt 116 which is engagable with a bell crank 118.  
2 The bell crank 118 is pivotally coupled to the side support member  
3 74 on a pin 120. One end of the bell crank 118 is engagable by  
4 the threaded bolt 116, and a cam roller 122 is mounted for  
5 rotation on its opposite end. The striking point of engagement is  
6 adjusted by rotation of the bolt 116 so that the applicator roller  
7 66 is properly positioned for inking/coating engagement with the  
8 plate P or blanket B and provides the desired amount of ink-  
9 ing/coating pressure when the inking/coating assembly 60 is moved  
10 to the operative position.

11 This arrangement permits the in-line inking/coating  
12 apparatus to operate effectively without encroaching in the  
13 interunit space between any adjacent printing units, and without  
14 blocking or obstructing access to the cylinders of the printing  
15 units when the inking/coating apparatus is in the extended (off-  
16 impression) position or retracted (on-impression) position.  
17 Moreover, when the in-line inking/coating apparatus is in the  
18 retracted position, the doctor blade reservoir and coating  
19 circulation lines can be drained and flushed automatically while  
20 the printing press is running as well as when the press has been  
21 stopped for change-over from one job to another or from one type  
22 of ink or coating to another.

23 Substrates which are printed or coated with aqueous  
24 flexographic printing inks require high velocity hot air for  
25 drying. When printing a flexographic ink such as opaque white or  
26 metallic gold, it is always necessary to dry the printed sub-  
27 strates between printing units before overprinting them.  
28 According to the present invention, the water component on the  
29 surface of the freshly printed or coated substrate S is evaporated  
30 and dried by high velocity, hot air interunit dryer and high  
31 volume heat and moisture extractor units 124, 126 and 128, as  
32 shown in FIGURE 2, FIGURE 4 and FIGURE 5. The dryer/extractor  
33 units 124, 126 and 128 are oriented to direct high velocity heated  
34 air onto the freshly printed/coated substrates as they are  
35 transferred by the impression cylinder 36 and the intermediate

transfer drum 40 of one printing unit and to another transfer cylinder 30 and to the impression cylinder 36 of the next printing unit. By that arrangement, the freshly printed flexographic ink or coating material is dried before the substrate S is overprinted by the next printing unit.

The high velocity, hot air dryer and high performance heat and moisture extractor units 124, 126 and 128 utilize high velocity air jets which scrub and break-up the moist air layer which clings to the surface of each freshly printed or coated sheet or web. Within each dryer, high velocity air is heated as it flows across a resistance heating element within an air delivery baffle tube. High velocity jets of hot air are discharged through multiple airflow apertures into an exposure zone Z (FIGURE 4 and FIGURE 5) and onto the freshly printed/coated sheet S as it is transferred by the impression cylinder 36 and transfer drum 40, respectively.

Each dryer assembly includes a pair of air delivery dryer heads 124D, 126D and 128D which are arranged in spaced, side-by-side relationship. The high velocity, hot air dryer and high performance heat and moisture extractor units 124, 126 and 128 are preferably constructed as disclosed in co-pending U.S. Patent Application Serial No. 08/132,584, filed October 6, 1993, entitled "High Velocity Hot Air Dryer", to Howard W. DeMoore, co-inventor and assignee of the present invention, and which is incorporated herein by reference, and which is marketed by Printing Research, Inc. of Dallas, Texas, U.S.A., under its trademark SUPER BLUE HV™.

The hot moisture-laden air displaced from the surface of each printed or coated sheet is extracted from the dryer exposure zone Z and exhausted from the printing unit by the high volume extractors 124, 126 and 128. Each extractor head includes an extractor manifold 124E, 126E and 128E coupled to the dryer heads 124D, 126D and 128D and draws the moisture, volatiles, odors and hot air through a longitudinal air gap G between the dryer heads. Best results are obtained when extraction is performed simulta-

1 neously with drying. Preferably, an extractor is closely coupled  
2 to the exposure zone Z at each dryer location as shown in FIGURE  
3 4. Extractor heads 124E, 126E and 128E are mounted on the dryer  
4 heads 124D, 126D and 128D, respectively, with the longitudinal  
5 extractor air gap G facing directly into the exposure zone Z.  
6 According to this arrangement, each printed or coated sheet is  
7 dried before it is printed on the next printing unit.

8 The aqueous water-based inks used in flexographic  
9 printing evaporate at a relatively moderate temperature provided  
10 by the interunit high velocity hot air dryers/extractors 124, 126  
11 and 128. Sharpness and print quality are substantially improved  
12 since the flexographic ink or coating material is dried before it  
13 is overprinted on the next printing unit. Since the freshly  
14 printed flexographic ink is dry, dot gain is substantially reduced  
15 and back-trapping on the blanket of the next printing unit is  
16 virtually eliminated. This interunit drying/extracting arrange-  
17 ment makes it possible to print flexographic inks such as metallic  
18 ink and opaque white ink on the first printing unit, and then dry-  
19 trap and overprint on the second and subsequent printing units.

20 Moreover, this arrangement permits the first printing  
21 unit 22 to be used as a coater in which a flexographic, aqueous or  
22 UV-curable coating material is applied to the lowest grade  
23 substrate such as recycled paper, cardboard, plastic and the like,  
24 to trap and seal-in lint, dust, spray powder and other debris and  
25 provide a smoother, more durable printing surface which can be  
26 overprinted on the next printing unit.

27 A first down (primer) aqueous coating layer seals-in the  
28 surface of a low grade, rough substrate, for example, re-cycled  
29 paper or plastic, and improves overprinted dot definition and  
30 provides better ink lay-down while preventing strike-through and  
31 show-through. A flexographic UV-curable coating material can then  
32 be applied downstream over the primer coating, thus producing  
33 higher coating gloss.

34 Preferably, the applicator roller 66 is constructed of  
35 composite carbon fiber material, metal or ceramic coated metal

1 when it is used for applying ink or coating material to the  
2 blanket B or other resilient material on the blanket cylinder 34.  
3 When the applicator roller 66 is applied to the plate, it is  
4 preferably constructed as an anilox roller having a resilient,  
5 compressible transfer surface. Suitable resilient roller surface  
6 materials include Buna N synthetic rubber and EPDM (terpolymer  
7 elastomer).

8 It has been demonstrated in prototype testing that the  
9 inking/coating apparatus 10 can apply a wide range of ink and  
10 coating types, including fluorescent (Day Glo), pearlescent,  
11 metallics (gold, silver and other metals), glitter, scratch and  
12 sniff (micro-encapsulated fragrance), scratch and reveal,  
13 luminous, pressure-sensitive adhesives and the like, as well as  
14 UV-curable and aqueous coatings.

15 With the dampener assembly removed from the printing  
16 unit, the inking/coating apparatus 10 can easily be installed in  
17 the dampener space for selectively applying flexographic inks  
18 and/or coatings to a flexographic or waterless printing plate or  
19 to the blanket. Moreover, overprinting of the flexographic inks  
20 and coatings can be performed on the next printing unit since the  
21 flexographic inks and/or coatings are dried by the high velocity,  
22 hot air interunit dryer and high volume heat and moisture  
23 extractor assembly of the present invention.

24 The flexographic inks and coatings as used in the  
25 present invention contain colored pigments and/or soluble dyes,  
26 binders which fix the pigments onto the surface of the substrate,  
27 waxes, defoamers, thickeners and solvents. Aqueous printing inks  
28 predominantly contain water as a diluent and/or vehicle. The  
29 thickeners which are preferred include algonates, starch,  
30 cellulose and its derivatives, for example cellulose esters or  
31 cellulose ethers and the like. Coloring agents including organic  
32 as well as inorganic pigments may be derived from dyes which are  
33 insoluble in water and solvents. Suitable binders include  
34 acrylates and/or polyvinylchloride.

1           When metallic inks are printed, the cells of the anilox  
2 roller must be appropriately sized to prevent the metal particles  
3 from getting stuck within the cells. For example, for metallic  
4 gold ink, the anilox roller should have a screen line count in the  
5 range of 175-300 lines per inch (68-118 lines per cm). Prefera-  
6 bly, in order to keep the anilox roller cells clear, the doctor  
7 blade assembly 68 is equipped with a bristle brush BR (FIGURE 14)  
8 as set forth in U.S. Patent 5,425,809 to Steven M. Person,  
9 assigned to Howard W. DeMoore, and licensed to Printing Research,  
10 Inc. of Dallas, Texas, U.S.A., which is incorporated herein by  
11 reference.

12           The inking/coating apparatus 10 can also apply UV-  
13 curable inks and coatings. If UV-curable inks and coatings are  
14 utilized, ultra-violet dryers/extractors are installed adjacent to  
15 the high velocity hot air dryer/extractor units 124, 126 and 128,  
16 respectively.

17           It will be appreciated that the LITHOFLEX™ printing  
18 process described herein makes it possible to selectively operate  
19 a printing unit of a press in the lithographic printing mode while  
20 simultaneously operating another printing unit of the same press  
21 in either the flexographic printing mode or in the waterless  
22 printing mode, while also providing the capability to print or  
23 coat, separately or simultaneously, from either the plate position  
24 or the blanket position. The dual cradle support arrangement of  
25 the present invention makes it possible to quickly change over  
26 from inking/coating on the blanket cylinder position to ink-  
27 ing/coating on the plate cylinder position with minimum press  
28 down-time, since it is only necessary to remove and reposition or  
29 replace the applicator roller 66 while the inking/coating  
30 apparatus 10 is in the retracted position. It is only necessary  
31 to remove four cap screws, lift the applicator roller 66 from the  
32 cradle, and reposition it in the other cradle. All of this can be  
33 accomplished in a few minutes, without removing the inking/coating  
34 apparatus 10 from the press.

1           It is possible to spot coat or overall coat from the  
2 plate position or from the blanket position with flexographic inks  
3 or coatings on one printing unit and then spot coat or overall  
4 coat with UV-curable inks or coatings from the plate position or  
5 from the blanket position on another printing unit during the same  
6 press run. Moreover, the press operator can spot or overall coat  
7 from the plate for one job, and then spot and/or overall coat from  
8 the blanket on the next job.

9           The positioning of the applicator roller relative to the  
10 plate or blanket is repeatable to a predetermined preset operative  
11 position. Consequently, only minor printing unit modifications or  
12 alterations may be required for the LITHOFLEX™ process. Although  
13 automatic extension and retraction have been described in  
14 connection with the exemplary embodiment, extension to the  
15 operative (on-impression) position and retraction to a non-  
16 operative (off-impression) position can be carried out manually,  
17 if desired. In the manual embodiment, it is necessary to latch  
18 the inking/coating apparatus 10 to the press side frames 14, 15 in  
19 the operative (on-impression) position, and to mechanically prop  
20 the inking/coating apparatus in the off-impression (retracted)  
21 position.

22           Referring again to FIGURE 8, an applicator roller 66 is  
23 mounted on the lower cradle assembly 100 by side support members  
24 78, 80, and a second applicator roller 66 is mounted on the upper  
25 cradle assembly 102 by side support members 82, 84. According to  
26 this arrangement, the inking/coating apparatus 10 can apply  
27 printing ink and/or coating material to a plate on the plate  
28 cylinder, while simultaneously applying printing ink and/or  
29 coating material to a plate or a blanket on the blanket cylinder  
30 of the same printing unit. When the same color ink is used by the  
31 upper and lower applicator rollers from the plate position and  
32 from the blanket position simultaneously on the same printing  
33 unit, a "double bump" or double inking films or coating layers are  
34 applied to the substrate S during a single pass of the substrate  
35 through the printing unit. The tack of the two inks or coating

1 materials must be compatible for good transfer during the double  
2 bump. Moreover, the inking/coating apparatus 10 can be used for  
3 supplying ink or coating material to the blanket cylinder of a  
4 rotary offset web press, or to the blanket of a dedicated coating  
5 unit.

6 According to conventional bronzing techniques, a  
7 metallic (bronze) powder is applied off-line to previously printed  
8 substrate which produces a grainy, textured finish or appearance.  
9 The on-line application of bronze material by conventional flexo-  
10 graphic or lithographic printing will only produce a smooth,  
11 continuous appearance. However, a grainy, textured finish is  
12 preferred for highest quality printing which, prior to the present  
13 invention, could only be produced by off-line methods.

14 Referring now to FIGURE 14 and FIGURE 15, metallic ink  
15 or coating material is applied on-line to the substrate S by  
16 simultaneous operation of the upper and lower applicator rollers  
17 67R, 66 to produce an uneven surface finish having a bronze-like  
18 textured or grainy appearance. According to the simulated  
19 bronzing method of the present invention, the flexographic bronze  
20 ink is applied simultaneously to the plate and to the blanket by  
21 the dual cradle inking/coating apparatus 10 as shown in FIGURE 14.  
22 A resilient applicator roller 67R is mounted in the upper cradle  
23 102, and an anilox applicator roller 66 is mounted on the lower  
24 cradle 100. The rollers are supplied from separate doctor blade  
25 reservoirs 70. The doctor blade reservoir 70 in the upper cradle  
26 position supplies bronze ink or coating material having relatively  
27 coarse, metallic particles 140 dispersed in aqueous or flexo-  
28 graphic ink. The coarse particle ink or coating material is  
29 applied to the plate P by the resilient applicator roller 67R in  
30 the upper cradle position 102. At the same time, flexographic  
31 and/or bronze ink or coating material having relatively fine,  
32 metallic particles 142 is transferred to the blanket B by the  
33 anilox roller 66 which is mounted on the lower cradle 100.

34 The metering surfaces of the upper and lower applicator  
35 rollers have different cell sizes and volumetric capacities which

1 accommodate the coarse and fine metallic particles. For example,  
2 the anilox roller 111 mounted in the upper cradle position 102  
3 which transfers the coarse metallic particles 140 preferably has  
4 a screen line count in the range of 100-300 lines per inch (39-118  
5 lines per cm), and the metering surface of the anilox roller 66  
6 mounted on the lower cradle 100 which transfers the relatively  
7 fine metallic particles 142 preferably has a screen line count in  
8 the range of 200-600 lines per inch (79-236 lines per cm).

9 After transfer from the plate to the blanket, the fine  
10 metallic particles 142 form a layer over the coarse metallic  
11 particles 140. As both bronze layers are offset onto the  
12 substrate S, the layer of fine metallic particles 142 is printed  
13 onto the substrate S with the top layer of coarse metallic  
14 particles 140 providing a textured, grainy appearance. The fine  
15 metallic particles 142 cover the substrate which would otherwise  
16 be visible in the gaps between the coarse metallic particles 140.  
17 The combination of the coarse particle layer over the fine  
18 particle layer thus provides a textured, bronzed-like finish and  
19 appearance.

20 Particulate materials other than metal can be used for  
21 producing a textured finish. For example, coarse and fine  
22 particles of metallized plastic (glitter), mica particles  
23 (pearlescent) and the like, can be substituted for the metallic  
24 particles for producing unlimited surface variations, appearances  
25 and effects. All of the particulate material, including the  
26 metallic particles, are preferably in solid, flat platelet form,  
27 and have a size dimension suitable for application by an anilox  
28 applicator roller. Other particulate or granular material, for  
29 example stone grit having irregular form and size, can be used to  
30 good advantage.

31 Solid metal particles in platelet form, which are good  
32 reflectors of light, are preferred for producing the bronzed-like  
33 appearance and effect. However, various textured finishes, which  
34 could have light-reflective properties, can be produced by using  
35 granular materials such as stone grit. Most commonly used metals



1 include copper, zinc and aluminum. Other ductile metals can be  
2 used, if desired. Moreover, the coarse and fine particles need  
3 not be made of the same particulate material. Various effects and  
4 textured appearances can be produced by utilizing diverse  
5 particulate materials for the coarse particles and the fine  
6 particles, respectively. Further, either fine or coarse particle  
7 ink or coating material can be printed from the upper cradle  
8 position, and either fine or coarse particle ink or coating  
9 material can be printed from the lower cradle position, depending  
10 on the special or surface finish that is desired.

11 It will be appreciated that the last printing unit 28  
12 can be configured for additional inking/coating capabilities which  
13 include lithographic, waterless, aqueous and flexographic  
14 processes. Various substrate surface effects (for example double  
15 bump or triple bump inking/coating or bronzing) can be performed  
16 on the last printing unit. For triple bump inking/coating, the  
17 last printing unit 28 is equipped with an auxiliary in-line inking  
18 or coating apparatus 97 as shown in FIGURE 3 and FIGURE 4. The  
19 in-line inking or coating apparatus 97 allows the application of  
20 yet another film of ink or a protective or decorative layer of  
21 coating material over any freshly printed or coated surface  
22 effects or special treatments, thereby producing a triple bump.  
23 The triple bump is achieved by applying a third film of ink or  
24 layer of coating material over the freshly printed or coated  
25 double bump simultaneously while the substrate is on the impres-  
26 sion cylinder of the last printing unit.

27 When the in-line inking/coating apparatus 97 is  
28 installed, it is necessary to remove the SUPER BLUE® flexible  
29 covering from the delivery cylinder 42, and it is also necessary  
30 to modify or convert the delivery cylinder 42 for inking/coating  
31 service by mounting a plate or blanket B on the delivery cylinder  
32 42, as shown in FIGURE 3 and FIGURE 4. Packing material is placed  
33 under the plate or blanket B, thereby packing the plate or blanket  
34 B at the correct packed-to-print radial clearance so that ink or  
35 coating material will be printed or coated onto the freshly

1 printed substrate S as it transfers through the nip between the  
2 plate or blanket B on the converted delivery cylinder 42 and the  
3 last impression cylinder 36. According to this arrangement, a  
4 freshly printed or coated substrate is overprinted or overcoated  
5 with a third film or layer of ink or coating material simulta-  
6 neously while a second film or layer of ink or coating material is  
7 being over-printed or over-coated on the last impression cylinder  
8 36.

9           The auxiliary inking/coating apparatus 97 and the  
10 converted or modified delivery cylinder 42 are mounted on the  
11 delivery drive shaft 43. The inking/coating apparatus 97 includes  
12 an applicator roller, preferably an anilox applicator roller 97A,  
13 for supplying ink or coating material to a plate or blanket B on  
14 the modified or converted delivery cylinder 42. The in-line  
15 inking/coating apparatus 97 and the modified or converted delivery  
16 cylinder 42 are preferably constructed as described in U.S. Patent  
17 5,176,077 to Howard W. DeMoore (co-inventor and assignee), which  
18 is hereby incorporated by reference. The in-line inking/coating  
19 apparatus 97 is manufactured and sold by Printing Research, Inc.  
20 of Dallas, Texas, U.S.A., under its trademark SUPER BLUE EZ  
21 COATER™.

22 After the delivery cylinder 42 has been modified or  
23 converted for inking/coating service, and because of the reduced  
24 nip clearance imposed by the plate or blanket B, the modified  
25 delivery cylinder 42 can no longer perform its original function  
26 of guiding and transferring the freshly printed or coated  
27 substrate. Instead, the modified or converted delivery cylinder  
28 42 functions as a part of the inking/coating apparatus 97 by  
29 printing or coating a third down film of ink or layer of coating  
30 material onto the freshly printed or coated substrate as it is  
31 simultaneously printed or coated on the last impression cylinder  
32 36. Moreover, the mutual tack between the second down ink film or  
33 coating layer and the third down ink film or coating layer causes  
34 the overprinted or overcoated substrate to cling to the plate or

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1 blanket, thus opposing or resisting separation of the substrate  
2 from the plate or blanket.

3 To remedy this problem, a vacuum-assisted transfer  
4 apparatus 99 is mounted adjacent the modified or converted  
5 delivery cylinder 42 as shown in FIGURE 3 and FIGURE 4. Another  
6 purpose of the vacuum-assisted transfer apparatus 99 is to  
7 separate the freshly overprinted or overcoated triple bump  
8 substrate from the plate or blanket B as the substrate transfers  
9 through the nip. The vacuum-assisted transfer apparatus 99  
10 produces a pressure differential across the freshly overprinted or  
11 overcoated substrate as it transfers through the nip, thus  
12 producing a separation force onto the substrate and providing a  
13 clean separation from the plate or blanket B.

14 The vacuum-assisted transfer apparatus 99 is preferably  
15 constructed as described in U.S. Patent Nos. 5,113,255; 5,127,329;  
16 5,205,217; 5,228,391; 5,243,909; and 5,419,254, all to Howard W.  
17 DeMoore, co-inventor, which are incorporated herein by reference.  
18 The vacuum-assisted transfer apparatus 99 is manufactured and sold  
19 by Printing Research, Inc. of Dallas, Texas, U.S.A. under its  
20 trademark BACVAC™.

21 Although the present invention and its advantages have  
22 been described in detail, it should be understood that various  
23 changes, substitutions and alterations can be made herein without  
24 departing from the spirit and scope of the present invention as  
defined by the appended claims.

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What is claimed is:

- 1           1.    In a printing press of the type having first and  
2           second side frame members forming a printing unit on which a plate  
3           cylinder, a blanket cylinder and an impression cylinder are  
4           supported for rotation, the improvement comprising:  
5                    inking/coating apparatus movably coupled to the  
6           printing unit for movement to an on-impression operative position  
7           and to an off-impression retracted position; and,  
8                    the inking/coating apparatus including means for  
9           applying ink or coating material to a plate mounted on the plate  
10          cylinder, or to a plate or blanket mounted on the blanket  
11          cylinder, either separately or simultaneously when the ink-  
12          inking/coating apparatus is in the operative position.
- 13          2.    The invention as set forth in claim 1, wherein the  
14          inking/coating apparatus comprises:  
15                    a doctor blade assembly having a reservoir for  
16          receiving ink or coating material;  
17                    an applicator roller coupled to the doctor blade  
18          assembly in fluid communication with the reservoir, the applicator  
19          roller being engagable with a printing plate on the plate cylinder  
20          or with a blanket on the blanket cylinder when the inking/coating  
                apparatus is in the operative position.
- 1           3.    The invention as set forth in claim 2, the  
2           applicator roller comprising:  
3                    an anilox roller having a resilient transfer  
                surface.
- 1           4.    The invention as set forth in claim 1, including:  
2                    first and second pivot pins mounted on the first  
3           and second side frame members, respectively, said pivot pins  
4           extending in alignment with the plate and blanket cylinders; and

5 the inking/coating apparatus being pivotally  
6 coupled for rotational movement on the pivot pins.

7 5. The invention as set forth in claim 1, further  
8 comprising:

9 a power actuator pivotally coupled to the printing  
10 unit, the power actuator having a power transfer arm which is  
11 extendable and retractable; and,

12 apparatus coupled to the power transfer arm and to  
13 the inking/coating apparatus for converting extension or retrac-  
14 tion movement of the power transfer arm into pivotal movement of  
15 the inking/coating apparatus relative to the plate and blanket  
cylinders.

1 6. The invention as set forth in claim 5, in which the  
2 movement converting apparatus comprises:

3 a bell crank plate having a first end portion  
4 pivotally coupled to the inking/coating apparatus for engaging the  
5 printing unit and having a second end portion for engaging a stop  
6 member; and,

7 a stop member coupled to the inking/coating  
8 apparatus for engaging the second end portion of the bell crank  
9 plate.

10 7. The invention as set forth in claim 1, the  
11 inking/coating apparatus comprising:

12 an applicator head having first and second side  
13 support members;

14 the ink or coating applying means being mounted  
15 between the first side support member and second side support  
16 member and having a reservoir or fountain pan for receiving ink or  
17 coating material;

18 cradle means mounted on the first and second side  
19 support members, respectively;

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20 applicator roller means including at least one  
21 applicator roller mounted for rotation on the cradle means and  
22 disposed for rolling contact with ink or coating material in the  
23 reservoir or fountain pan, the applicator roller being engagable  
24 with a printing plate on the plate cylinder or with a blanket on  
25 the blanket cylinder in the operative position; and,  
26 power transfer means coupled to the applicator  
roller means for rotating the at least one applicator roller.

1 8. The invention as set forth in claim 7,  
2 the at least one cradle means including first and  
3 second cradles disposed on the first and second side support  
4 members respectively; and,  
5 the applicator roller being mounted for rotation on  
one of the first and second cradles.

1 9. The invention as set forth in claim 7,  
2 the cradle means including a first cradle assembly  
3 disposed on the first and second side support members, respective-  
4 ly, and a second cradle assembly disposed on the first and second  
5 side support members, respectively;  
6 the applicator roller means including a first  
7 applicator roller mounted for rotation on the first cradle  
8 assembly for applying ink or coating material to a plate mounted  
9 on the plate cylinder when the inking/coating apparatus is in the  
10 operative position; and,  
11 the applicator roller means including a second  
12 applicator roller mounted for rotation on the second cradle  
13 assembly for applying ink or coating material to a plate or a  
14 blanket mounted on the blanket cylinder when the inking/coating  
apparatus is in the operative position.

1 10. The invention as set forth in claim 1, wherein the  
2 printing unit having a dampener space, and the inking/coating  
3 apparatus being disposed within the dampener space.

4                   11. A printing press comprising, in combination:  
5                   a printing unit;  
6                   at least one cylinder mounted for rotation in the  
7 printing unit for printing ink or coating material onto a  
8 substrate transferring through said printing unit;  
9                   inking/coating apparatus having container means for  
10 containing liquid ink or coating material, a rotatable applicator  
11 roller and means for applying liquid ink or coating material from  
12 the container means to a peripheral surface portion of the  
13 applicator roller; and,  
14                   support means mounted on the printing unit, said  
15 inking/coating apparatus being movably coupled to the support  
16 means for movement to an operative on-impression position in which  
17 the applicator roller is engagable with a plate or a blanket  
18 mounted on said at least one cylinder, and for movement to an off-  
19 impression position in which the inking/coating apparatus is  
retracted away from said at least one cylinder.

1                   12. A printing press as defined in claim 11, wherein  
2 the container means comprises a doctor blade assembly having a  
3 reservoir or fountain pan for supplying ink or coating material to  
4 the applicator roller, and having a doctor blade disposed for  
5 wiping engagement with the applicator roller when it is received  
6 in rolling contact with ink or coating material in the reservoir  
or pan.

1                   13. A printing press as defined in claim 11, wherein  
2 the container means comprises a fountain pan and the inking  
3 applying means comprises a pan roller for transferring ink or  
coating material from the fountain pan to the applicator roller.

1                   14. A printing unit of the type having a delivery side  
2 and a dampener side comprising, in combination:

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3 a plate cylinder mounted on the printing unit  
4 between the delivery side and the dampener side, and a printing  
5 plate mounted on the plate cylinder;

6 a blanket cylinder having an ink or coating  
7 receptive blanket disposed in ink or coating transfer engagement  
8 with the plate for transferring ink or coating material from the  
9 image surface areas of the printing plate to the ink or coating  
10 receptive blanket;

11 an impression cylinder disposed adjacent the  
12 blanket cylinder thereby forming a nip between the blanket and the  
13 impression cylinder whereby the printing ink or coating material  
14 is transferred from the blanket to a substrate as the substrate is  
15 transferred through the nip;

16 support means mounted on the dampener side of the  
17 printing unit; and,

18 inking/coating apparatus for applying ink or  
19 coating material to the plate or to the blanket, the inking/  
20 coating apparatus being movably coupled to the support means for  
21 movement to an operative, on-impression position in which the  
22 inking/coating apparatus is engagable with the plate or the  
23 blanket, and for movement to an off-impression position in which  
24 the inking/coating apparatus is retracted and disengaged from the  
plate and blanket.

1 15. The invention as defined in claim 14, including:  
2 a dryer mounted on the printing unit for discharg-  
3 ing heated air onto a freshly printed or coated substrate before  
4 the freshly printed or coated substrate is subsequently printed,  
coated or otherwise processed.

1 16. The invention as defined in claim 14, wherein:  
2 the dryer is mounted adjacent to the impression  
3 cylinder for discharging heated air onto a freshly printed or  
4 coated substrate while the substrate is in contact with the  
impression cylinder.



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1           17. The invention as defined in claim 14, comprising:  
2           an extractor coupled to the dryer for extracting  
3 hot air, moisture, odors and volatiles from an exposure zone  
between the dryer and the freshly printed or coated substrate.

1           18. The invention as defined in claim 14, comprising:  
2           a transfer cylinder disposed in an interunit  
3 position on the press and coupled in sheet transfer relation with  
4 the impression cylinder; and,  
5           an interunit dryer disposed adjacent the transfer  
6 cylinder for discharging heated air onto a freshly printed or  
7 coated substrate after it has been transferred from the impression  
cylinder and while it is in contact with the transfer cylinder.

1           19. In a printing press of the type having first and  
2 second side frame members providing support for a printing unit in  
3 which a blanket cylinder is disposed between the delivery side and  
4 the dampener side of the printing unit, the improvement compris-  
5 ing:  
6           support means mounted on the side frame members on  
7 the dampener side of the printing unit;  
8           inking/coating apparatus for applying ink or  
9 coating material to a blanket mounted on the blanket cylinder when  
10 the inking/coating apparatus is in the operative on-impression  
11 position; and,  
12           the inking/coating apparatus being pivotally  
13 coupled to the support means for movement to the operative  
14 position in which the inking/coating apparatus is supported  
15 laterally adjacent to the blanket cylinder, and to an off-  
16 impression position in which the inking/coating apparatus is  
retracted away from the blanket cylinder.

1           20. The invention as set forth in claim 19, wherein the  
2 printing unit includes a plate cylinder and a plate mounted on the  
3 plate cylinder, the inking/coating apparatus including:

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4. first cradle means for supporting an applicator  
5 roller for engagement with the plate when the inking/coating  
6 apparatus is in the operative position; and,

7 second cradle means for supporting an applicator  
8 roller for engagement with the blanket when the inking/coating  
apparatus is in the operative position.

1 21. The invention as set forth in claim 19, said  
2 support means comprising:

3 first and second pivot means mounted on the first  
and second side frame members, respectively.

1 22. The invention as set forth in claim 19, further  
2 comprising:

3 a power actuator pivotally coupled to the ink-  
4 ing/coating apparatus, the power actuator having a power transfer  
5 arm which is selectively extendable or retractable; and,

6 apparatus coupled to the power transfer arm and to  
7 the inking/coating apparatus for converting extension or retrac-  
8 tion movement of the power transfer arm into pivotal movement of  
the inking/coating apparatus relative to the printing unit.

1 23. The invention as set forth in claim 19, further  
2 comprising:

3 a bell crank plate having a first end portion  
4 coupled to the inking/coating apparatus and having a second end  
5 portion for engaging a stop member; and,

6 a stop member secured to the inking/coating  
7 apparatus for engaging the second end portion of the bell crank  
plate.

1 24. The invention as set forth in claim 1, wherein the  
2 inking/coating apparatus comprises:

3 an applicator roller having a resilient transfer  
surface.

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1           25. The invention as set forth in claim 1, wherein the  
2 applicator roller is supported for engagement with a plate on the  
3 plate cylinder in the operative position, the applicator roller  
comprising an anilox roller having a resilient transfer surface.

1           26. A printing press having a lithographic printing  
2 unit comprising, in combination:

3           a plate cylinder having a waterless printing plate  
4 mounted thereon, the waterless printing plate having non-image  
5 surface areas which are oleophobic and hydrophobic, and having  
6 image surface areas which are oleophilic and hydrophilic;

7           a blanket cylinder having an ink or coating  
8 receptive blanket disposed in ink or coating transfer engagement  
9 with the waterless printing plate for receiving printing ink or  
10 coating material from the image surface areas of the waterless  
11 printing plate;

12           an impression cylinder disposed adjacent the  
13 blanket cylinder thereby forming a nip between the blanket and the  
14 impression cylinder wherein printing ink or coating material can  
15 be transferred from the blanket to a substrate as the substrate is  
16 transferred through the nip;

17           inking/coating apparatus movably coupled to the  
18 printing unit for movement to an on-impression operative position  
19 and to an off-impression retracted position; and,

20           the inking/coating apparatus including applicator  
21 means for applying aqueous or flexographic ink or coating material  
22 to the waterless printing plate mounted on the plate cylinder or  
23 to a blanket mounted on the blanket cylinder, either separately or  
24 simultaneously, when the inking/coating apparatus is in the  
operative position.

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1           27. A printing press as defined in claim 26 including:  
2           a dryer mounted on the printing unit for discharg-  
3 ing heated air onto a freshly printed or coated substrate before  
4 the freshly printed or coated substrate is subsequently printed,  
coated or otherwise processed.

1           28. A printing press as defined in claim 27, wherein:  
2           the dryer is mounted adjacent the impression  
3 cylinder for discharging heated air onto a freshly printed or  
4 coated substrate while the substrate is in contact with the  
impression cylinder.

1           29. A printing press as defined in claim 26, compris-  
2 ing:

3           a substrate transfer apparatus disposed in an  
4 interunit position on the press and coupled in sheet transfer  
5 relation with the impression cylinder;

6           an interunit dryer disposed adjacent the substrate  
7 transfer apparatus for discharging heated air onto a freshly  
8 printed or coated substrate after it has been transferred from the  
9 printing unit and while it is in contact with the transfer  
cylinder.

1           30. A printing press as defined in claim 26, compris-  
2 ing:

3           a dryer mounted on the printing unit for discharg-  
4 ing heated air onto a freshly printed or coated substrate; and,

5           an extractor coupled to the dryer for extracting  
6 hot air and moisture vapors from an exposure zone between the  
dryer and the freshly printed or coated substrate.

1           31. A printing press as defined in any one of claims 1,  
2 11, 14, 19 or 26, including:

3           a supply container for containing a volume of  
4 liquid ink or coating material;

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5                   circulation means coupled between the supply  
6     reservoir and the inking/coating apparatus for inducing the flow  
7     of liquid ink or coating material from said supply container to  
8     the inking/coating apparatus and for returning liquid ink or  
9     coating material from the inking/coating apparatus to the supply  
10    container; and,

11                   heat exchanger means coupled to the circulation  
12    means for maintaining the temperature of the liquid ink or coating  
    material within a predetermined temperature range.

1                   32. A printing press as set forth in any one of the  
2     claims 1, 11, 14, 19 or 26, wherein the inking/coating apparatus  
3     comprises:

4                   a fountain pan for containing a volume of liquid  
5     ink or coating material;

6                   an applicator roller having a metering surface;  
7     and,

8                   a pan roller mounted for rotation in the fountain  
9     pan and coupled to the applicator roller for transferring ink or  
    coating material from the fountain pan to the applicator roller.

1                   33. A printing press as defined in any one of claims 1,  
2     11, 14, 19 or 26, characterized in that:

3                   a resilient packing is mounted on the blanket  
4     cylinder, and a printing plate is mounted on the resilient  
    packing.

1                   34. A printing press as defined in claim 14, further  
2     including:

3                   a transfer drum coupled in substrate transfer  
4     relation with the impression cylinder of a first printing unit and  
5     in substrate transfer relation with the impression cylinder of a  
6     second printing unit;

7                   a first dryer mounted adjacent the impression  
8     cylinder of the first printing unit for discharging heated air

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9 onto a freshly printed or coated substrate while the substrate is  
10 in contact with the impression cylinder of the first printing  
11 unit;

12 a second dryer mounted adjacent the transfer drum  
13 for discharging heated air onto a freshly printed or coated  
14 substrate after it has been transferred from the impression  
15 cylinder of the first printing unit and while it is in contact  
16 with the transfer cylinder; and,

17 a third dryer disposed adjacent the impression  
18 cylinder of the second printing unit for discharging heated air  
19 onto a freshly printed or coated substrate after it has been  
20 transferred from the transfer drum and while it is in contact with  
the impression cylinder of the second printing unit.

1 35. A printing press as defined in any one of claims 1,  
2 11, 14, 19 or 26, wherein the means for applying ink or coating  
3 material comprises:

4 first cradle means;

5 a first reservoir or fountain means mounted on the  
6 first cradle means for containing ink or coating material;

7 a first applicator roller mounted for rotation on  
8 the first cradle means and disposed for rolling contact with ink  
9 or coating material in the first reservoir or fountain means, the  
10 first applicator roller being engagable with a printing plate on  
11 the plate cylinder;

12 second cradle means;

13 a second reservoir or fountain means mounted on the  
14 second cradle means for receiving ink or coating material;

15 a second applicator roller mounted for rotation on  
16 the second cradle means and disposed for rolling contact with ink  
17 or coating material in the second reservoir or fountain means, the  
18 second applicator roller being engagable with a plate or blanket  
mounted on the blanket cylinder in the operative position.

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1           36. A printing press as defined in any one of claims  
2 11, 14, 19 or 26, wherein the inking/coating apparatus is  
3 pivotally mounted on the printing unit in a position in which the  
4 nip contact point between the applicator roller and a blanket or  
5 plate is offset with respect to a radius line projecting through  
6 the center of the plate cylinder or blanket cylinder to the axis  
of rotation of the printing/coating unit.

1           37. A printing press as defined in any one of claims  
2 11, 14, 19 or 26, characterized in that:

3           the applicator roller having first and second  
4 metering transfer surfaces and a seal band surface disposed  
5 between and separating the first and second metering transfer  
6 surfaces;

7           the reservoir means having a chamber and a  
8 partition seal disposed within the chamber, the partition seal  
9 dividing the chamber thereby defining a first reservoir chamber  
10 region and a second reservoir chamber region; and,

11          the partition seal band element being disposed in  
sealing engagement against the seal band of the applicator roller.

1           38. A printing press as defined in any one of claims  
2 11, 14, 19 or 26, wherein the inking/coating apparatus comprises:

3           first cradle means for supporting a first applica-  
4 tor roller for engagement with a plate or blanket when the  
5 inking/coating apparatus is in the operative position;

6           second cradle means for supporting a second  
7 applicator roller for engagement with a plate or blanket when the  
8 inking/coating apparatus is in the operative position;

9           a first applicator roller mounted for rotation on  
10 the first cradle means, the first applicator roller having first  
11 and second fluid metering transfer surfaces and a seal band  
12 separating the first and second fluid metering transfer surfaces;

13          a second applicator roller mounted for rotation on  
14 the second cradle means, the second applicator roller having first

15 and second fluid metering transfer surfaces and a seal band  
16 separating the first and second metering transfer surfaces;

17 first reservoir means for containing a volume of  
18 ink or coating material, the first reservoir means having first  
19 and second reservoir chambers and a partition seal element  
20 separating the first and second reservoir chambers;

21 second reservoir means for containing a volume of  
22 ink or coating material, the second reservoir means having first  
23 and second reservoir chambers and a partition seal element  
24 separating the first and second reservoir chambers of the second  
25 reservoir means;

26 the first and second reservoir means being coupled  
27 to the first and second applicator rollers, respectively, the  
28 first and second fluid metering transfer surfaces of the first  
29 applicator roller being disposed for rolling contact with ink or  
30 coating material in the first and second reservoir chambers,  
31 respectively, of the first reservoir means and the first partition  
32 seal element being disposed in sealing engagement against the seal  
33 band of the first applicator roller in the coupled position; and,

34 the first and second fluid metering transfer  
35 surfaces of the second applicator roller being disposed for  
36 rolling contact with ink or coating material in the first and  
37 second reservoir chambers, respectively, of the second reservoir  
38 means and the partition seal element of the second reservoir means  
39 being disposed in sealing engagement with the partition seal band  
of the second applicator roller in the coupled position.

1 39. A printing press as defined in any one of claims  
2 11, 14, 19 or 26, wherein the inking/coating apparatus comprises:

3 first cradle means for supporting a first applica-  
4 tor roller for engagement with a plate or blanket when the  
5 inking/coating apparatus is in the operative position;

6 second cradle means for supporting a second  
7 applicator roller for engagement with a plate or blanket when the  
8 inking/coating apparatus is in the operative position;



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9 first reservoir means mounted on the first cradle  
10 means, said first reservoir means having a reservoir chamber for  
11 containing a volume of ink or coating material;

12 second reservoir means mounted on the second cradle  
13 means, said second reservoir means having a reservoir chamber for  
14 containing a volume of ink or coating material;

15 a first applicator roller mounted for rotation on  
16 the first cradle means, the first applicator roller having a fluid  
17 metering transfer surface;

18 a second applicator roller mounted for rotation on  
19 the second cradle means, the second applicator roller having a  
20 fluid metering transfer surface;

21 the first and second applicator rollers being  
22 coupled to the first and second reservoir means, respectively, the  
23 fluid metering transfer surfaces of the first and second applica-  
24 tor rollers being disposed for rolling contact with ink or coating  
25 material in the reservoir chambers of the first and second  
26 reservoir means, respectively; and,

27 the volumetric capacity of the fluid metering  
28 surface of the first applicator roller being different from the  
29 volumetric capacity of the fluid metering surface of the second  
applicator roller.

1 40. A printing press as defined in any one of claims 1,  
2 11, 14, 19 or 26, wherein the means for applying ink or coating  
3 material comprises:

4 cradle means;

5 an applicator roller mounted for rotation on the  
6 cradle means, the applicator roller having first and second fluid  
7 metering transfer surfaces and a seal band separating the first  
8 and second metering transfer surfaces;

9 reservoir means for containing a volume of ink or  
10 coating material, the reservoir means having first and second  
11 reservoir chambers and a partition seal element separating the  
12 first and second reservoir chambers;

13 the applicator roller being coupled to the  
14 reservoir means with the first and second fluid metering transfer  
15 surfaces being disposed for rolling contact with the ink or  
16 coating material in the first and second reservoir chambers,  
17 respectively, and the partition seal element being disposed in  
18 sealing engagement against the seal band of the applicator roller  
19 in the coupled position; and,

20 the volumetric capacity of the first fluid metering  
21 transfer surface being different from the volumetric capacity of  
the second fluid metering transfer surface.

1 41. A method for rotary offset printing in a rotary  
2 offset press of the type including first and second printing  
3 units, the first printing unit having a flexographic printing  
4 plate, a blanket, an impression cylinder and applicator means for  
5 applying aqueous or flexographic printing ink or coating material  
6 to the flexographic printing plate and/or to the blanket,  
7 comprising the following steps performed in succession in the  
8 first printing unit:

9 applying a first spot or overall coating of aqueous  
10 or flexographic printing ink or coating material to the flexo-  
11 graphic printing plate;

12 transferring the aqueous or flexographic printing  
13 ink or coating material from the flexographic printing plate to  
14 the blanket;

15 applying a second spot or overall film of aqueous  
16 or flexographic printing ink or layer of coating material to the  
17 blanket;

18 transferring ink or coating material from the  
19 blanket to a substrate as the substrate is transferred through the  
20 nip between the blanket and the impression cylinder; and,

21 drying the aqueous or flexographic ink or coating  
22 material on the freshly printed or coated substrate before the  
23 substrate is printed, coated or otherwise processed on the second  
printing unit.

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1           42. A rotary offset printing press of the type  
2     including first and second printing units, the first printing unit  
3     comprising:  
4           a plate cylinder having a flexographic printing  
5     plate mounted thereon;  
6           a blanket cylinder having a blanket disposed in ink  
7     or coating transfer engagement with the flexographic printing  
8     plate for receiving aqueous or flexographic printing ink or  
9     coating material from the flexographic printing plate;  
10          an impression cylinder disposed adjacent the  
11     blanket cylinder thereby forming a nip between the blanket and the  
12     impression cylinder whereby the aqueous or flexographic printing  
13     ink or coating material can be transferred from the blanket to a  
14     substrate as the substrate is transferred through the nip;  
15          inking/coating apparatus movably coupled to the  
16     printing unit for movement to an on-impression operative position  
17     and to an off-impression retracted position;  
18          the inking/coating apparatus including container  
19     means for containing a volume of aqueous or flexographic ink or  
20     coating material, and an applicator roller coupled to the  
21     container means for applying the aqueous or flexographic ink or  
22     coating material to the flexographic printing plate or to the  
23     blanket when the inking/coating apparatus is in the on-impression  
24     operative position;  
25          the container means having a partition dam dividing  
26     the container means thereby defining a first container region and  
27     a second container region;  
28          the applicator roller having first and second  
29     transfer surfaces and means separating the first and second  
30     transfer surfaces; and,  
31          the first and second transfer surfaces being  
32     disposed within the first and second container regions for rolling  
33     contact with aqueous or flexographic printing ink or coating  
34     material contained within the first and second container regions,  
      respectively.

1           43. A rotary offset printing press as defined in claim  
2 42, wherein:

3               said separating means is an annular seal element  
4 disposed on the applicator roller; and,

5               the partition dam is disposed in sealing engagement  
against the annular seal element of the applicator roller.

1           44. A rotary offset printing press as defined in claim  
2 42, wherein:

3               said container means is an open fountain pan;

4               said separating means is an annular groove  
5 intersecting the applicator roller thereby separating the first  
6 and second transfer surfaces; and,

7               the partition dam is a separator plate mounted on  
8 the fountain pan between the first and second reservoir regions  
and disposed in the annular groove.

1           45. A printing press as defined in claim 42, including  
2 sheet feeding means coupled to the first printing unit for  
3 consecutively feeding substrates in sheet form into the first  
printing unit.

1           46. A printing press as defined in claim 42, including  
2 web feeding means coupled to the first printing unit for continu-  
3 ously feeding a substrate in continuous web form into the first  
printing unit.

1           47. A printing press as defined in claim 42, wherein:

2               said container means is a fountain pan having first  
3 and second pan sections for containing first and second aqueous or  
4 flexographic inks or coating materials, respectively;

5               said applicator roller having first and second  
6 transfer surfaces and an annular groove separating said first and  
7 second transfer surfaces; and,

8 a pan roller having first and second transfer  
9 surfaces mounted for rotation in the first and second pan  
10 sections, respectively, for separately transferring aqueous or  
11 flexographic ink or coating material from the first and second pan  
12 sections to the first and second transfer surfaces of the  
applicator roller.

1 48. A printing press as set forth in claim 42, wherein:  
2 said container means is a sealed doctor blade head  
3 having first and second reservoir chambers, said partition dam  
4 being mounted on the doctor blade head and separating the first  
5 and second reservoir chambers;

6 the applicator roller comprising a transfer roller  
7 having first and second transfer surfaces disposed for rolling  
8 contact with the aqueous or flexographic ink or coating material  
9 in the first and second reservoir chambers, respectively;

10 the separating means being a seal band formed on  
11 the applicator roller between the first and second transfer  
12 surfaces; and,

13 the partition dam being disposed in sealing  
14 engagement with the seal band of the applicator roller in the  
coupled position.

1 49. A method for rotary offset printing as defined in  
2 claim 41, including the steps:

3 applying a primer coating of an aqueous or  
4 flexographic ink or coating material to a substrate in the first  
5 printing unit;

6 trapping and sealing particulate material such as  
7 dust, lint, anti-offset spray powder and the like under the primer  
8 coating;

9 drying the primer coating on the substrate before  
10 the substrate is printed or coated on the second printing unit;  
11 and,

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12                   overprinting the freshly coated substrate in the  
                    second printing unit.

1                   50. A method for rotary offset printing as defined in  
2                   claim 41,

3                   wherein the drying step is performed by directing  
4                   heated air onto the freshly printed or coated substrate while the  
5                   freshly printed or coated substrate is in contact with the  
                    impression cylinder of the first printing unit.

1                   51. A method for rotary offset printing as defined in  
2                   claim 41, including the steps:

3                   transferring the freshly printed or coated  
4                   substrate to an intermediate transfer cylinder disposed between  
5                   the first and second printing units; and,

6                   drying the freshly printed or coated substrate  
7                   while said substrate is in contact with the intermediate transfer  
                    cylinder.

1                   52. A method for rotary offset printing as defined in  
2                   claim 41, wherein:

3                   the drying step is performed by directing heated  
4                   air onto the freshly printed or coated substrate while the freshly  
5                   printed or coated substrate is in contact with an impression  
                    cylinder in the second printing unit.

1                   53. A method for rotary offset printing as defined in  
2                   claim 41, wherein the drying step is performed by directing heated  
3                   air from a dryer onto the freshly printed or coated substrate, and  
4                   including the step:

5                   extracting hot air, moisture and volatiles from an  
6                   exposure zone between the freshly printed or coated substrate and  
7                   the dryer while the freshly printed or coated substrate is in  
                    contact with the impression cylinder of the first printing unit.

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1           54. A method for rotary offset printing as defined in  
2     claim 41, including the steps:  
3           transferring the freshly printed or coated  
4     substrate to an intermediate transfer cylinder disposed between  
5     the first and second printing units;  
6           directing heated air from a dryer onto the freshly  
7     printed or coated substrate while said substrate is in contact  
8     with the intermediate transfer cylinder; and,  
9           extracting hot air, moisture and volatiles from an  
10    exposure zone between the freshly printed or coated substrate and  
11    said dryer while the freshly printed or coated substrate is in  
    contact with the intermediate transfer cylinder.

1           55. A method for rotary offset printing as defined in  
2     claim 41, including the steps:  
3           transferring the freshly printed or coated  
4     substrate to an impression cylinder on the second printing unit;  
5           directing heated air from a dryer onto the freshly  
6     printed or coated substrate while said substrate is in contact  
7     with the impression cylinder of the second printing unit; and,  
8           extracting hot air, moisture and volatiles from an  
9     exposure zone between the freshly printed or coated substrate and  
10    said dryer while said substrate is in contact with the impression  
    cylinder of the second printing unit.

1           56. A method for providing an uneven printed or coated  
2     layer on a substrate in a rotary offset printing press of the type  
3     including a printing unit having a plate cylinder, a flexographic  
4     printing plate mounted on the plate cylinder, a blanket cylinder,  
5     a plate or blanket mounted on the blanket cylinder, an impression  
6     cylinder and applicator means for applying aqueous or flexographic  
7     printing ink or coating material to the flexographic printing  
8     plate and/or to the plate or blanket on the blanket cylinder,  
9     comprising the following steps performed in succession in the  
10    printing unit:

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11                   applying a first down layer of aqueous or flexo-  
12   graphic ink or coating material containing relatively coarse  
13   particles to the flexographic plate;  
14                   transferring the relatively coarse particle  
15   printing ink or coating material from the flexographic printing  
16   plate to the plate or blanket on the blanket cylinder;  
17                   applying a second down layer of aqueous or  
18   flexographic printing ink or coating material containing relative-  
19   ly fine particles onto the relatively coarse particle printing ink  
20   or coating material;  
21                   transferring the coarse and fine particle ink or  
22   coating material from the blanket or plate on the blanket cylinder  
23   onto a substrate as the substrate is transferred through the nip  
24   between the blanket cylinder and the impression cylinder; and,  
25                   drying the freshly printed or coated substrate  
26   before the freshly printed or coated substrate is subsequently  
   printed, coated or otherwise processed.

1                   57. A method for producing a textured finish on the  
2   surface of a substrate as set forth in claim 56, wherein the  
3   coarse and fine particles comprise a metal selected from the group  
   including copper, zinc and aluminum.

1                   58. A method for producing a textured finish on the  
2   surface of a substrate as set forth in claim 56, wherein the  
3   coarse and fine particles comprise a non-metallic material  
4   selected from the group consisting of mica, silicon, stone grit  
   and plastic.

1                   59. A method for producing a textured finish on the  
2   surface of a substrate as set forth in claim 56, wherein the  
3   coarse and fine particles comprise diverse particulate materials,  
   respectively.



1           60. A method for rotary offset printing in a rotary  
 2 offset press of the type including first and second printing  
 3 units, the first printing unit having a waterless printing plate  
 4 mounted on a plate cylinder, a flexographic printing plate or a  
 5 blanket mounted on a blanket cylinder, an impression cylinder, an  
 6 inking roller train transferring waterless printing ink to the  
 7 waterless printing plate, and applicator means for applying  
 8 aqueous or flexographic printing ink or coating material to the  
 9 flexographic printing plate or blanket on the blanket cylinder,  
 10 comprising the following steps performed in succession in the  
 11 first printing unit:

12                 applying a film or layer of waterless printing ink  
 13 onto the waterless printing plate mounted on the plate cylinder;

14                 transferring the waterless printing ink from the  
 15 waterless printing plate to a blanket or flexographic printing  
 16 plate mounted on the blanket cylinder;

17                 applying a film or layer of aqueous or flexographic  
 18 printing ink or coating material over the waterless printing ink  
 19 on a blanket or flexographic printing plate mounted on the blanket  
 20 cylinder;

21                 transferring ink or coating material from the plate  
 22 or blanket mounted on the blanket cylinder onto a substrate as the  
 23 substrate is transferred through the nip between the flexographic  
 24 printing plate or blanket and the impression cylinder; and,

25                 drying the ink or coating material on the freshly  
 26 printed or coated substrate before the substrate is printed,  
 coated or otherwise processed on the second printing unit.

1           61. In a printing press of the type including a rotary  
 2 offset printing unit, the improvement comprising:

3                 a plate cylinder mounted on the printing unit, the  
 4 plate cylinder having a waterless printing plate mounted thereon;

5                 an inking roller train mounted on the printing unit  
 6 and coupled to the waterless printing plate for transferring  
 7 waterless printing ink to the waterless printing plate;

8 a blanket cylinder having an ink or coating  
9 material receptive blanket or relief plate disposed in ink or  
10 coating transfer engagement with the waterless printing plate for  
11 receiving waterless printing ink from the waterless printing  
12 plate;

13 applicator means mounted on the printing unit and  
14 coupled to the blanket or the relief plate of the printing unit  
15 for transferring aqueous or flexographic printing ink or coating  
16 material over the waterless printing ink on the blanket or the  
17 relief plate; and,

18 an impression cylinder disposed adjacent the  
19 blanket cylinder thereby forming a nip between the blanket or  
20 relief plate and the impression cylinder whereby printing ink or  
21 coating material can be transferred from the blanket or relief  
22 plate to a substrate as the substrate is transferred through the  
nip.

1 62. A printing press as defined in claim 61, the  
2 printing press including a second printing unit, further includ-  
3 ing:

4 a dryer mounted on the printing unit for discharg-  
5 ing heated air onto a freshly printed or coated substrate before  
6 the freshly printed or coated substrate is printed, coated or  
otherwise processed on the second printing unit.

1 63. A printing press as defined in claim 61, including:

2 a dryer mounted adjacent the impression cylinder of  
3 the first printing unit for discharging heated air onto a freshly  
4 printed or coated substrate while the substrate is in contact with  
the impression cylinder of the printing unit.

1 64. A printing press as defined in claim 61, compris-  
2 ing:

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3 a transfer cylinder disposed in an interunit  
4 position on the press and coupled in substrate transfer relation  
5 with the impression cylinder of the printing unit;

6 a dryer disposed adjacent the transfer cylinder for  
7 discharging heated air onto a freshly printed or coated substrate  
8 after it has been transferred from the printing unit and while it  
is in contact with the transfer cylinder.

1 65. A printing press as defined in claim 61, compris-  
2 ing:

3 a dryer mounted on the printing unit for discharg-  
4 ing heated air onto a freshly printed or coated substrate; and,

5 an extractor coupled to the dryer for extracting  
6 hot air and moisture vapors from an exposure zone between the  
dryer and the freshly printed or coated substrate.

1 66. A printing press as defined in claim 61, the  
2 printing press including a second printing unit, and the second  
3 printing unit having an impression cylinder, further including:

4 a transfer drum coupled in sheet transfer relation  
5 with the impression cylinder of the first printing unit and in  
6 substrate transfer relation with the impression cylinder of the  
7 second printing unit;

8 a first dryer mounted adjacent the impression  
9 cylinder of the first printing unit for discharging heated air  
10 onto a freshly printed or coated substrate while the substrate is  
11 in contact with the impression cylinder of the first printing  
12 unit;

13 a second dryer mounted adjacent the transfer drum  
14 for discharging heated air onto a freshly printed or coated  
15 substrate after it has been transferred from the impression  
16 cylinder of the first printing unit and while it is in contact  
17 with the transfer drum; and,

18 a third dryer disposed adjacent the impression  
19 cylinder of the second printing unit for discharging heated air

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20 onto a freshly printed or coated substrate after it has been  
21 transferred from the transfer drum and while it is in contact with  
the impression cylinder of the second printing unit.

1 67. A rotary offset printing press of the type  
2 including first and second consecutive printing units, wherein the  
3 second printing unit is a lithographic printing unit having a  
4 lithographic printing plate, a dampener for transferring dampening  
5 solution to the lithographic printing plate, and an inking roller  
6 train for transferring lithographic printing ink to the litho-  
7 graphic plate, characterized in that the first printing unit  
8 comprising:

9 a plate cylinder having a flexographic printing  
10 plate mounted thereon;

11 a blanket cylinder having a blanket or relief plate  
12 disposed in ink or coating transfer engagement with the flexo-  
13 graphic printing plate for receiving aqueous or flexographic  
14 printing ink or coating material from the flexographic printing  
15 plate;

16 applicator means mounted on the press and coupled  
17 to the blanket or relief plate for applying aqueous or flexo-  
18 graphic printing ink or coating material over the aqueous or  
19 flexographic printing ink or coating material on the blanket or  
20 the relief plate; and,

21 an impression cylinder disposed adjacent the  
22 blanket cylinder thereby forming a nip between the blanket or  
23 relief plate and the impression cylinder whereby printing ink or  
24 coating material can be transferred from the blanket or relief  
25 plate to a substrate as the substrate is transferred through the  
26 nip;

27 wherein the printing press further includes:

28 transfer cylinder means mounted on the printing  
29 press and coupled in substrate transfer relation with the  
30 impression cylinder of the first printing unit and with the  
31 impression cylinder of the second printing unit; and,

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32                   dryer means mounted on the printing press for  
33   discharging heated air onto a freshly printed or coated substrate  
34   before it is printed, coated or otherwise processed on the second  
   printing unit.

1                   68. A printing press as defined in claim 67, wherein:  
2                   said dryer means include a dryer mounted adjacent  
3   the impression cylinder of the first printing unit for discharging  
4   heated air onto a freshly printed or coated substrate while the  
5   substrate is in contact with the impression cylinder of the first  
   printing unit.

1                   69. A printing press as defined in claim 67, wherein:  
2                   said dryer means include an interunit dryer is  
3   disposed adjacent the transfer cylinder means for discharging  
4   heated air onto a freshly printed or coated substrate after it has  
5   been transferred from the first printing unit and while it is in  
   contact with the transfer cylinder means.

1                   70. A printing press as defined in claim 67, including:  
2                   an extractor coupled to the dryer means for  
3   extracting hot air and moisture vapors from an exposure zone  
4   between the dryer means and the freshly printed or coated  
   substrate.

1                   71. A printing press as defined in claim 67, wherein:  
2                   said transfer cylinder means include a transfer  
3   drum is coupled in substrate transfer relation with the impression  
4   cylinder of the first printing unit and in substrate transfer  
5   relation with the impression cylinder of the second printing unit;  
6                   said dryer means include:  
7                   a first dryer mounted on the press adjacent the  
8   impression cylinder of the first printing unit for discharging  
9   heated air onto a freshly printed or coated substrate while the

23 of aqueous or flexographic ink or coating material from the supply  
 24 container to the inking/coating apparatus and for returning ink or  
 25 coating material from the inking/coating apparatus to the supply  
 26 container; and,

27 heat exchanger means coupled to the circulation  
 28 means for maintaining the temperature of the aqueous or flexo-  
 29 graphic ink or coating material within a predetermined temperature  
 range.

1 73. A method for printing or coating a substrate in a  
 2 rotary offset printing press of the type including a printing unit  
 3 having a plate cylinder, a flexographic printing plate mounted on  
 4 the plate cylinder, a blanket cylinder, a plate or blanket mounted  
 5 on the blanket cylinder, an impression cylinder, and ink-  
 6 ing/coating apparatus for applying flexographic or aqueous  
 7 printing ink or coating material to the flexographic printing  
 8 plate and/or to the plate or blanket on the blanket cylinder,  
 9 comprising the following steps:

10 applying a first down film or layer of flexographic  
 11 or aqueous printing ink or coating material to the flexographic  
 12 printing plate;

13 transferring printing ink or coating material from  
 14 the flexographic printing plate to the plate or blanket on the  
 15 blanket cylinder;

16 applying a second down film or layer of aqueous or  
 17 flexographic printing ink or coating material over the first down  
 18 film or layer on the plate or blanket on the blanket cylinder;

19 transferring ink or coating material from the  
 20 blanket or plate on the blanket cylinder onto a substrate as the  
 21 substrate is transferred through the nip between the blanket  
 22 cylinder and the impression cylinder; and,

23 drying the freshly printed or coated substrate  
 24 before the substrate is subsequently printed, coated or otherwise  
 processed.

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1           74. A method of printing or coating a substrate in a  
2 rotary offset printing press as set forth in claim 73, wherein the  
3 printing unit is the last printing unit of the rotary offset  
4 printing press and a delivery cylinder is mounted on the last  
5 printing unit for transferring the freshly printed substrate along  
6 a substrate travel path, including the steps:

7           modifying the delivery cylinder by mounting a plate  
8 or blanket on the delivery cylinder;

9           transferring ink or coating material to the plate  
10 or blanket on the modified delivery cylinder; and

11           transferring a third down film or layer of aqueous  
12 or flexographic printing ink or coating material from the plate or  
13 blanket over the second down film or layer simultaneously while  
14 the freshly printed or coated substrate is on the last impression  
cylinder of the last printing unit.

1           75. A printing press having a last printing unit  
2 comprising, in combination:

3           a plate cylinder having a printing plate mounted  
4 thereon;

5           a blanket cylinder having a blanket disposed in  
6 inking or coating transfer engagement with the printing plate;

7           an impression cylinder disposed adjacent the  
8 blanket cylinder thereby forming a nip between the blanket  
9 cylinder and the impression cylinder wherein printing ink or  
10 coating material can be transferred from the blanket onto a  
11 substrate as the substrate is transferred through the nip;

12           a first inking/coating apparatus disposed on the  
13 dampener side of the last printing unit and movably coupled to the  
14 last printing unit for movement to an on-impression operative  
15 position and to an off-impression retracted position;

16           the first inking/coating apparatus including  
17 applicator means for applying ink or coating material to the  
18 printing plate mounted on the plate cylinder or to a plate or  
19 blanket mounted on the blanket cylinder, either separately or

20 simultaneously, when the first inking/coating apparatus is in the  
21 operative position;

22                    an inking/coating cylinder mounted on the last  
23    printing unit;

24           a plate or blanket mounted on the inking/coating  
25       cylinder for printing ink or coating material onto a freshly  
26       printed or coated substrate while the substrate is on the  
27       impression cylinder of the last printing unit; and,

28           a second inking/coating apparatus mounted on the  
29   delivery side of the last printing unit, the second inking/coating  
30   apparatus including applicator means for transferring ink or  
31   coating material to the plate or blanket on the inking/coating  
   cylinder.

1                   76. A printing press as set forth in claim 75,  
2   comprising:

3                   a vacuum-assisted substrate transfer apparatus  
4   mounted adjacent the inking/coating cylinder for separating the  
5   freshly overprinted or overcoated substrate from the plate or  
6   blanket as the substrate transfers through the nip between the  
   plate or blanket and the last impression cylinder.

1 77. A method for printing or coating a substrate on the  
2 last printing unit of a rotary offset printing press of the type  
3 including a plate cylinder, a printing plate mounted on the plate  
4 cylinder, a blanket cylinder, a plate or blanket mounted on the  
5 blanket cylinder, an impression cylinder, inking/coating apparatus  
6 for applying printing ink or coating material simultaneously or  
7 separately to the flexographic printing plate and/or to the plate  
8 or blanket on the blanket cylinder, and including an ink-  
9 ing/coating cylinder mounted adjacent the last printing unit for  
10 printing a film of ink or layer of coating material over a freshly  
11 printed substrate, comprising the steps:

12                   applying a first down film of printing ink or layer  
13   of coating material to the printing plate;



14                   transferring printing ink or coating material from  
15   the printing plate to a plate or blanket on the blanket cylinder;  
16                   applying a second down film of printing ink or  
17   layer of coating material over the first down film or layer on the  
18   plate or blanket on the blanket cylinder;  
19                   transferring ink or coating material from the  
20   blanket or plate on the blanket cylinder onto a substrate as the  
21   substrate is transferred through the nip between the blanket  
22   cylinder and the impression cylinder; and  
23                   simultaneously printing a third down film of  
24   printing ink or layer of coating material over the second down  
25   film of ink or layer of coating material while the second down  
26   film or layer is being printed or coated on the last impression  
cylinder.

1                   78. Inking/coating apparatus comprising, in combina-  
2   tion:  
3                   an applicator head having first and second side  
4   support members;  
5                   an upper cradle assembly disposed on the first and  
6   second side support members, respectively, and a lower cradle  
7   assembly disposed on the first and second side support members,  
8   respectively;  
9                   a first applicator roller mounted for rotation on  
10   the upper cradle assembly for applying ink or coating material to  
11   a plate mounted on the plate cylinder when the inking/coating  
12   apparatus is in the operative position; and,  
13                   a second applicator roller mounted for rotation on  
14   the lower cradle assembly for applying ink or coating material to  
15   a plate or a blanket mounted on the blanket cylinder when the  
inking/coating apparatus is in the operative position.

1                   79. In a printing press of the type having first and  
2   second side frame members forming a printing unit on which a plate

796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

3 cylinder, a blanket cylinder and an impression cylinder are  
4 supported for rotation, the improvement comprising:

5 inking/coating apparatus movably coupled to the  
6 printing unit for movement to an on-impression operative position  
7 and to an off-impression retracted position;

8 upper cradle means mounted on the inking/coating  
9 apparatus for supporting a first applicator roller for engagement  
10 with a plate or blanket on the plate cylinder when the ink-  
11 ing/coating apparatus is in the operative position;

12 lower cradle means mounted on the inking/coating  
13 apparatus for supporting a second applicator roller for engagement  
14 with a plate or blanket on the blanket cylinder when the ink-  
15 ing/coating apparatus is in the operative position; and,

16 the inking/coating apparatus including first and  
17 second applicator rollers mounted on the upper and lower cradle  
18 means, respectively, for applying ink or coating material to a  
19 plate mounted on the plate cylinder, or to a plate or blanket  
20 mounted on the blanket cylinder, either separately or simulta-  
21 neously when the inking/coating apparatus is in the operative  
position.

1 80. The improvement as set forth in claim 79, includ-  
2 ing:

3 a first reservoir or fountain pan mounted on the  
4 upper cradle means;

5 the first applicator roller being disposed for  
6 rolling contact with ink or coating material in the first  
7 reservoir or fountain pan;

8 a second reservoir or fountain pan mounted on the  
9 lower cradle means;

10 the second applicator roller being disposed for  
11 rolling contact with ink or coating material in the second  
12 reservoir or fountain pan; and,



"RETRACTABLE PRINTING/COATING UNIT OPERABLE ON THE PLATE  
AND BLANKET CYLINDERS SIMULTANEOUSLY FROM THE DAMPENER  
SIDE OF THE FIRST PRINTING UNIT OR ANY CONSECUTIVE  
PRINTING UNIT OF ANY ROTARY OFFSET PRINTING PRESS"

Abstract of the Disclosure

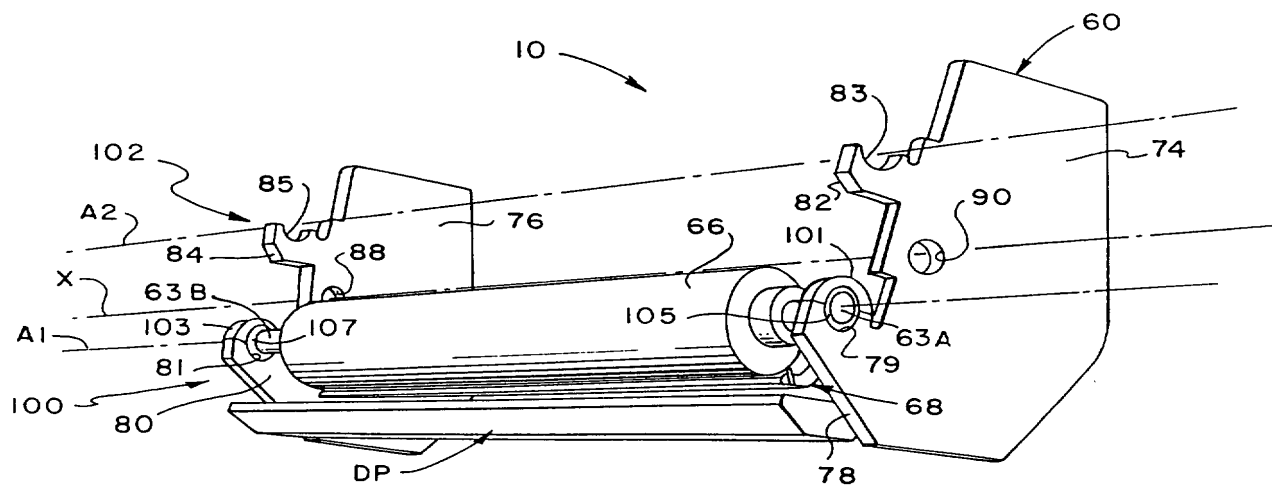
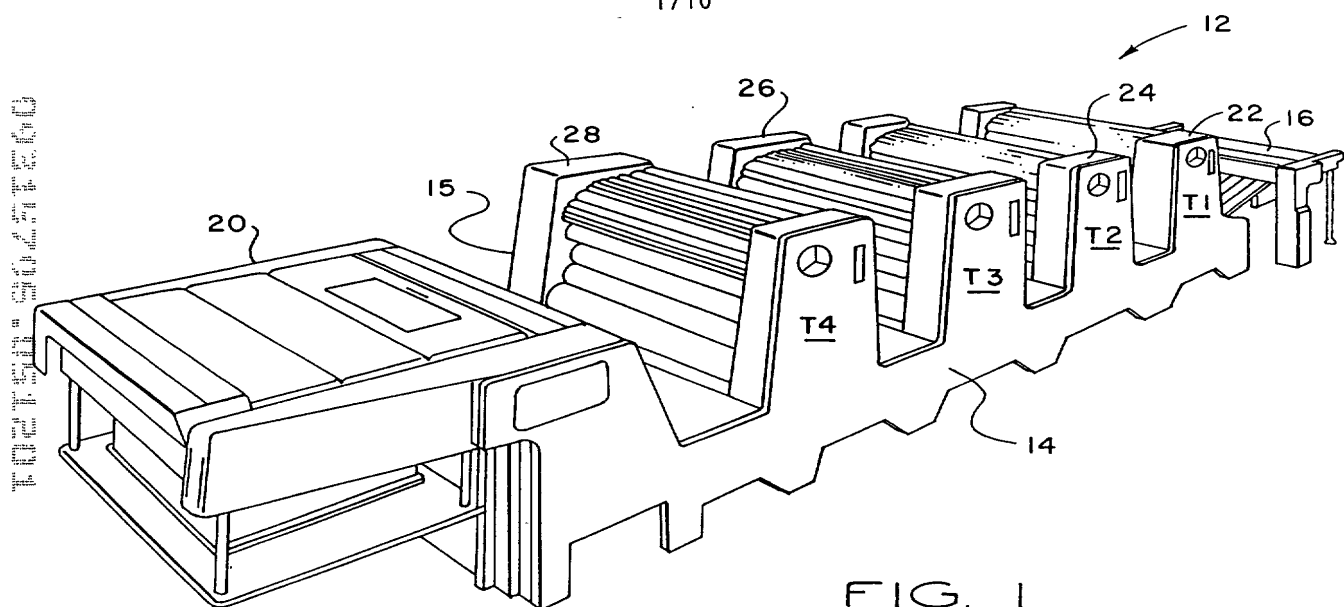
1 A retractable in-line inking/coating apparatus can apply  
2 either spot or overall inking/coating material to a plate and/or  
3 a blanket on the first printing unit or on any consecutive  
4 printing unit of any rotary offset printing press. The ink-  
5 ing/coating apparatus is pivotally mounted within the conventional  
6 dampener space of any lithographic printing unit. The aqueous  
7 component of the flexographic printing ink or aqueous coating  
8 material is evaporated and dried by high velocity, hot air dryers  
9 and high performance heat and moisture extractors so that the  
10 aqueous or flexographic ink or coating material on a freshly  
11 printed or coated sheet is dry and can be dry-trapped on the next  
12 printing unit. The inking/coating apparatus includes dual cradles  
13 that support first and second applicator rollers so that the ink-  
14 ing/coating apparatus can apply a double bump of aque-  
15 ous/flexographic or UV-curable printing ink or coating material to  
16 a plate on the plate cylinder, while simultaneously applying  
17 aqueous, flexographic or UV-curable printing ink or coating  
18 material to a plate or a blanket on the blanket cylinder, and  
19 thereafter onto a sheet as the sheet is transferred through the  
20 nip between the blanket cylinder and the impression cylinder. A  
21 triple bump is printed or coated on the last printing unit with  
22 the aid of an impression cylinder inking/coating unit.

\* \* \* \* \*

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JOHN W. BIRD

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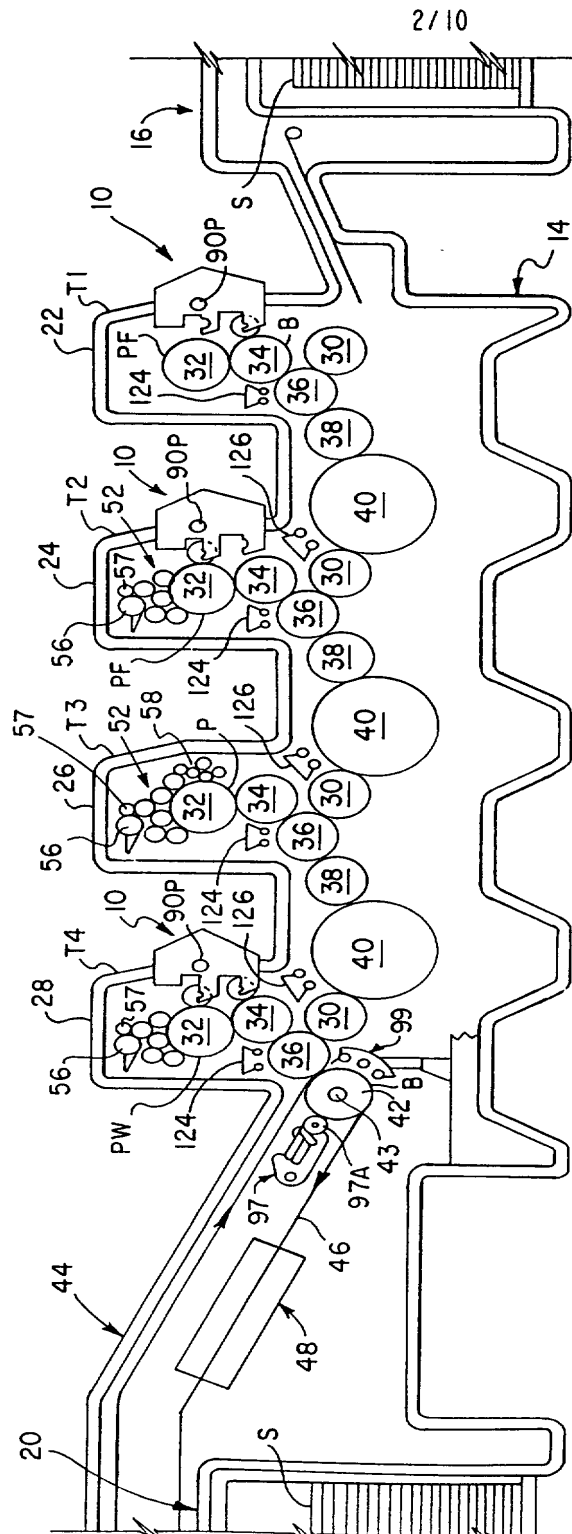


FIG. 3

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FIG. 3

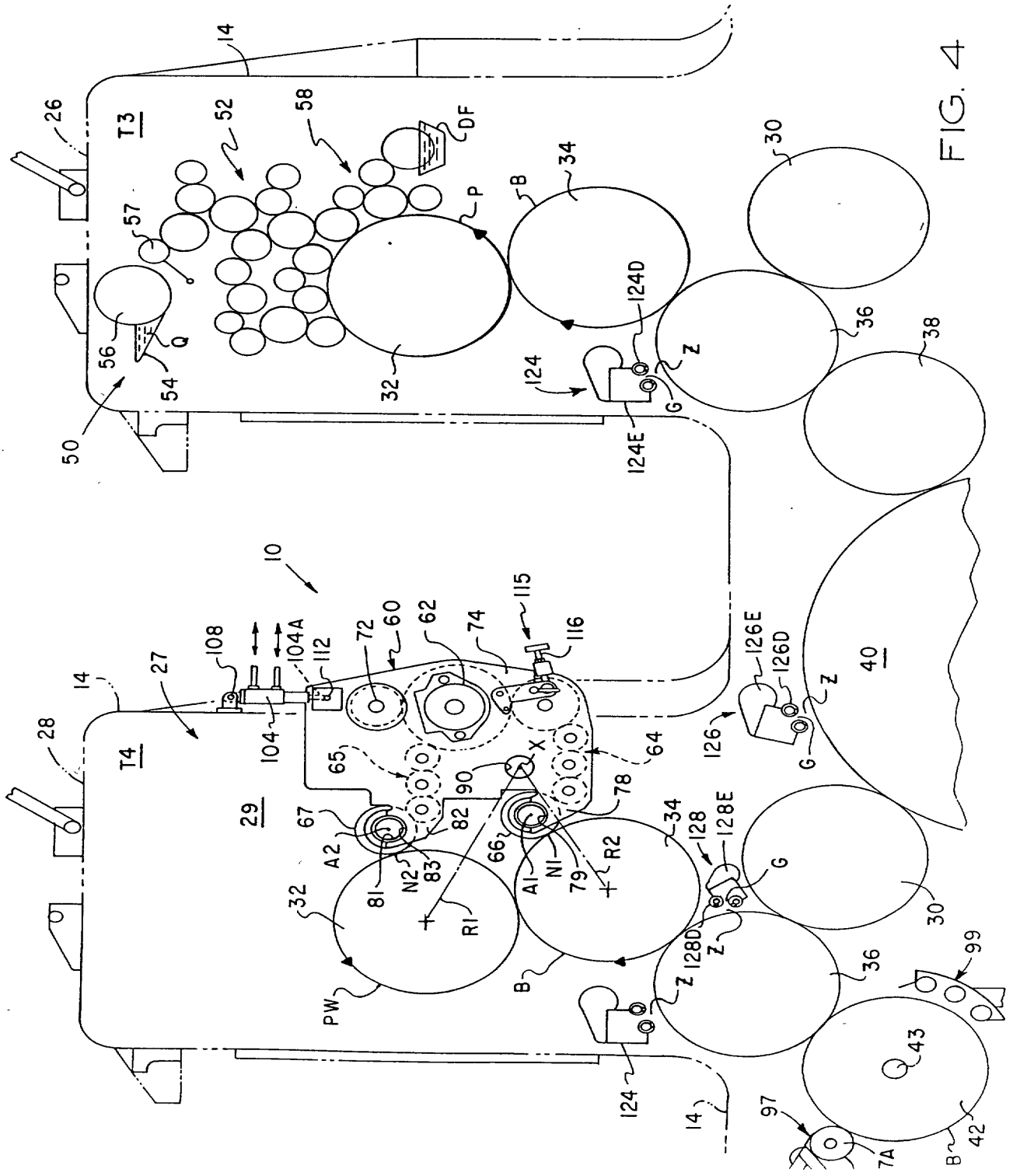


FIG. 4

FIG. 4

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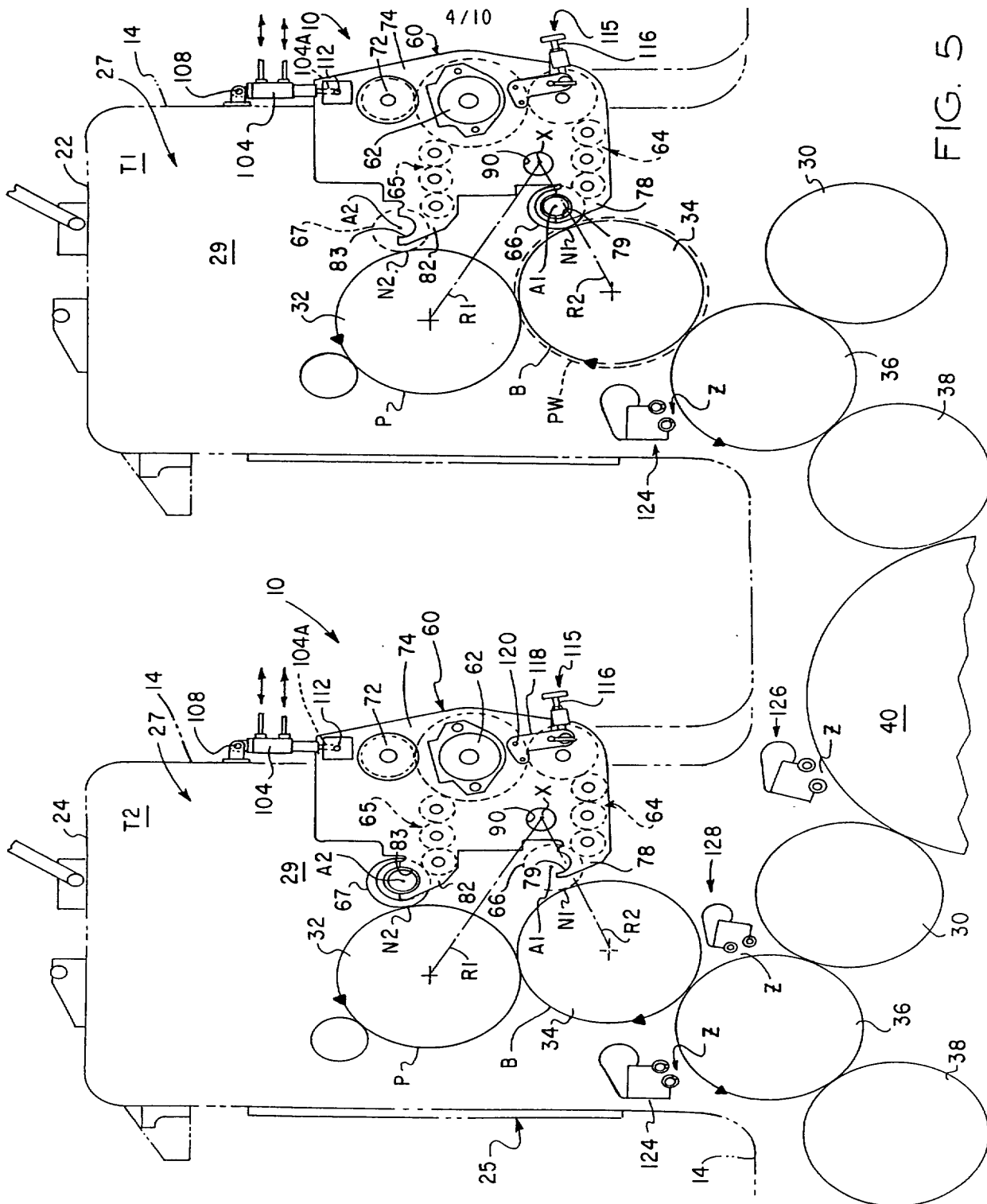


FIG. 5



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FIG. 6

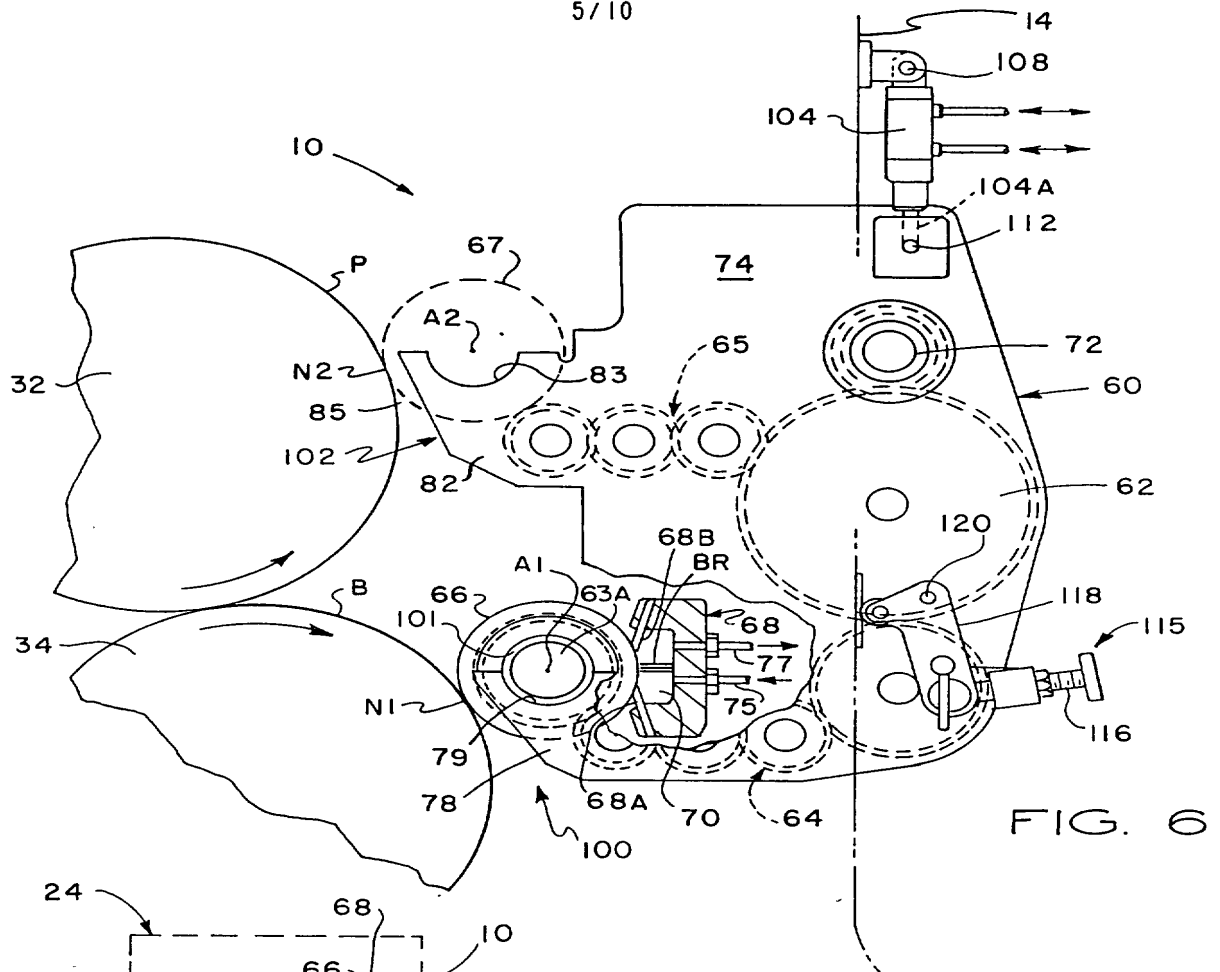


FIG. 6

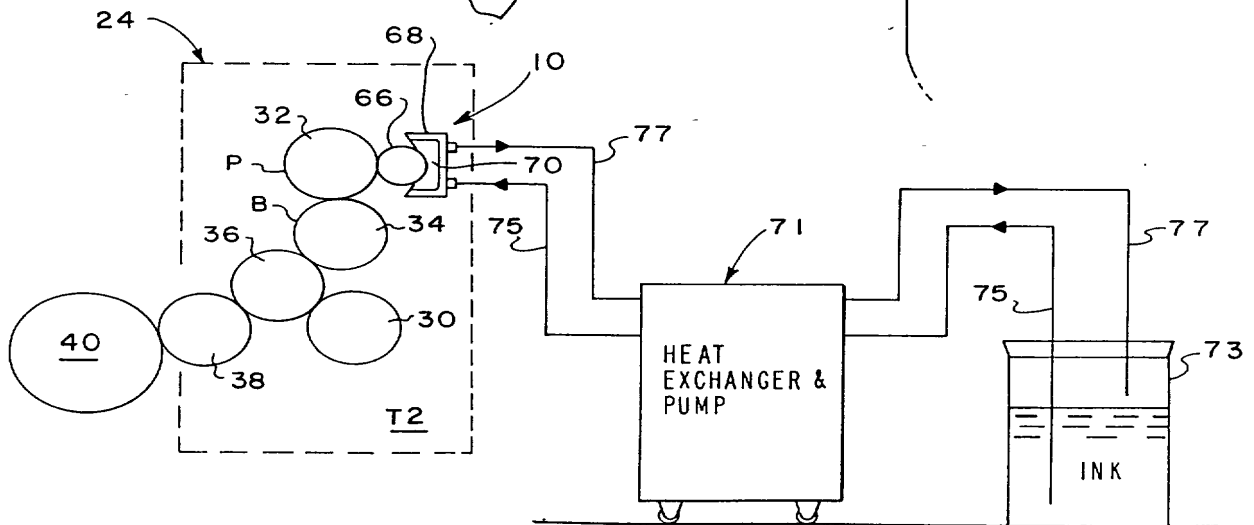


FIG. 7

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FIG. 8

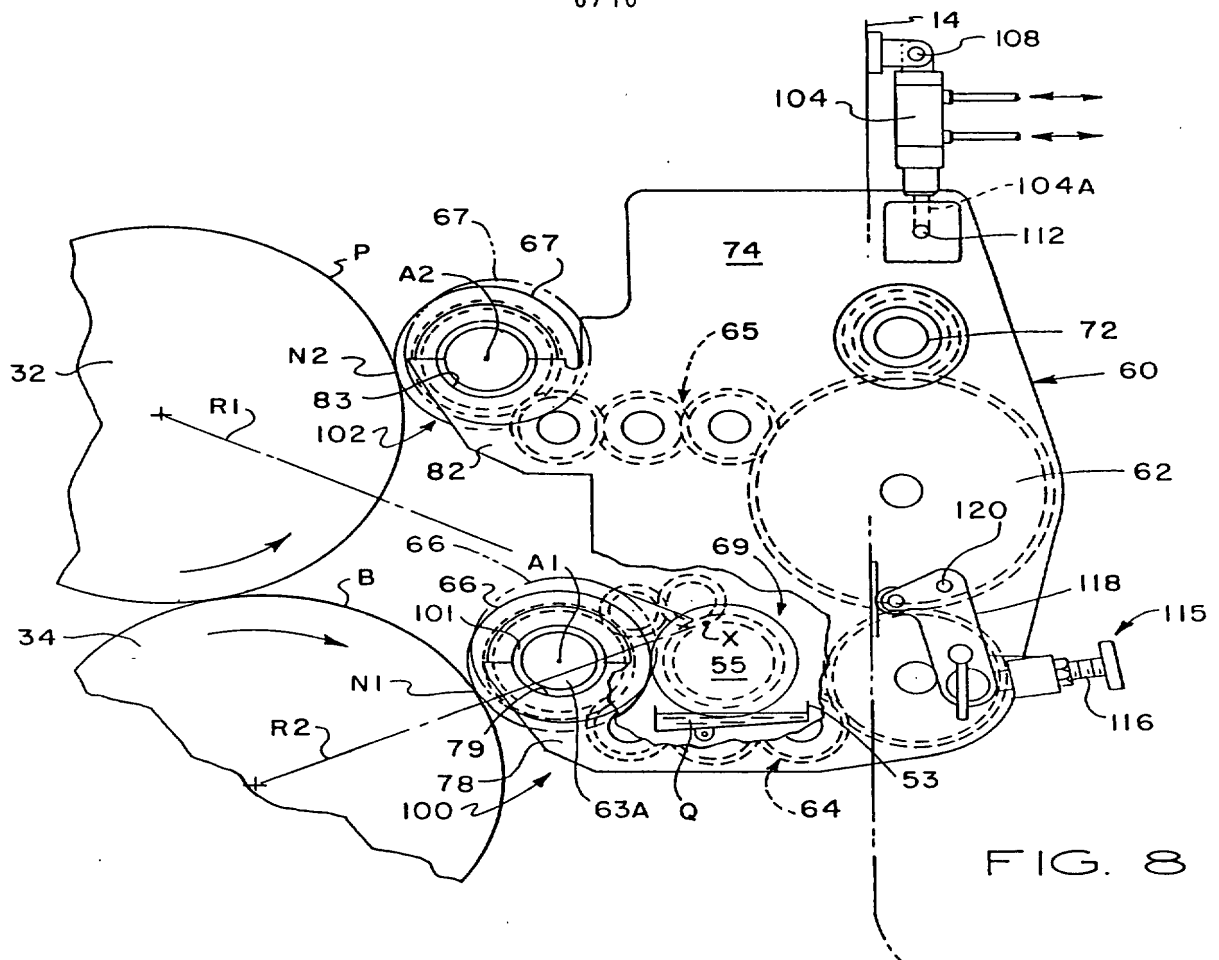


FIG. 8

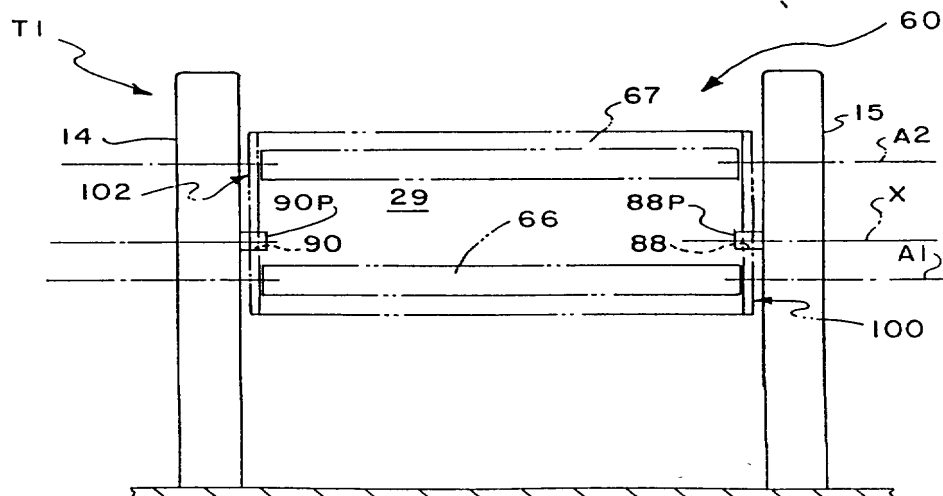


FIG. 9

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FIG. 10

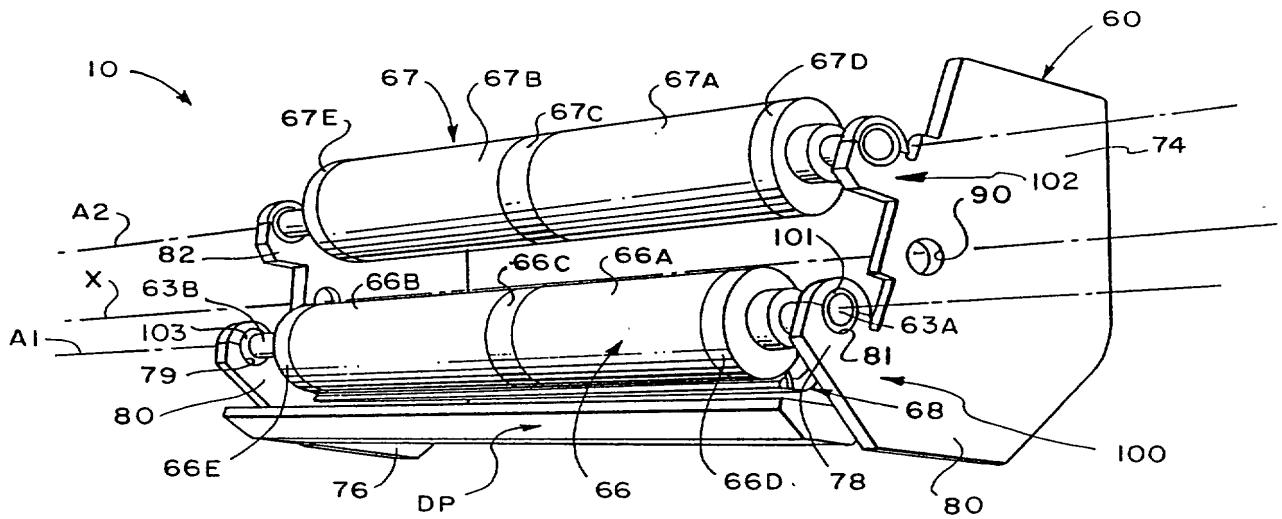


FIG. 10

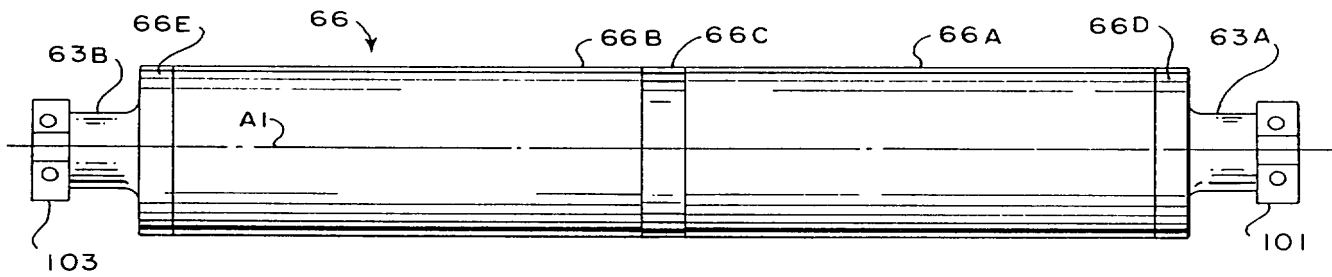


FIG. 11

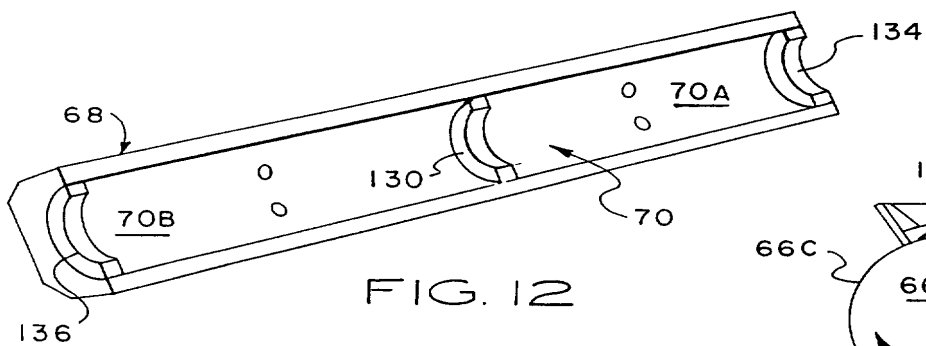


FIG. 12

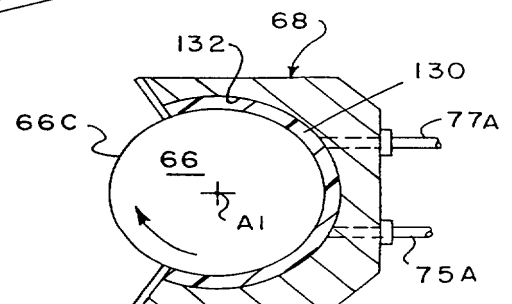


FIG. 13

B6038

HOWARD W. DEMOORE  
RONALD M. RENDLEMAN  
JOHN W. BIRD

8 / 10

FIG. 14

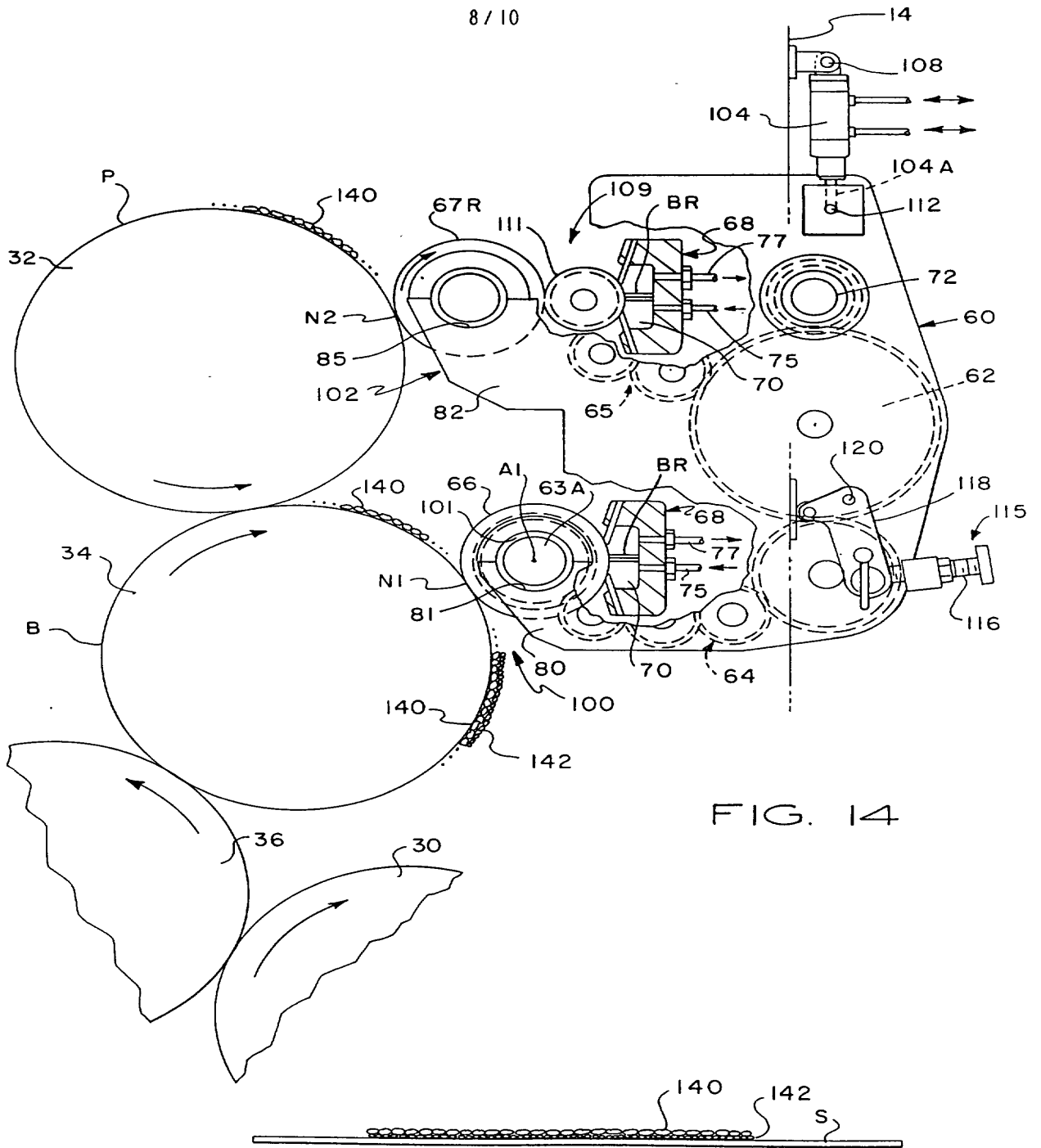


FIG. 14

FIG. 15

B6038

HOWARD W. DEMOORE  
RONALD M. RENDLEMAN  
JOHN W. BIRD

9/10

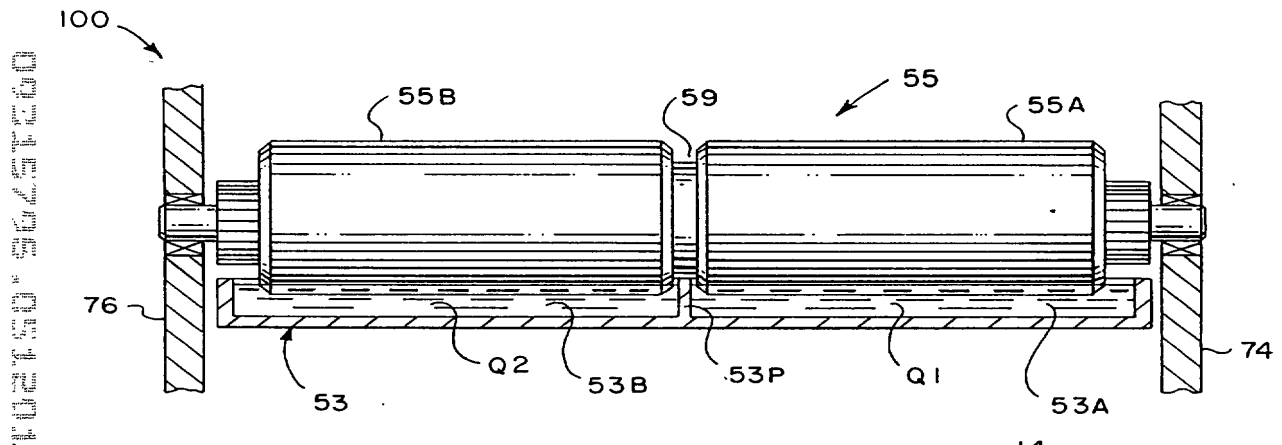


FIG. 16

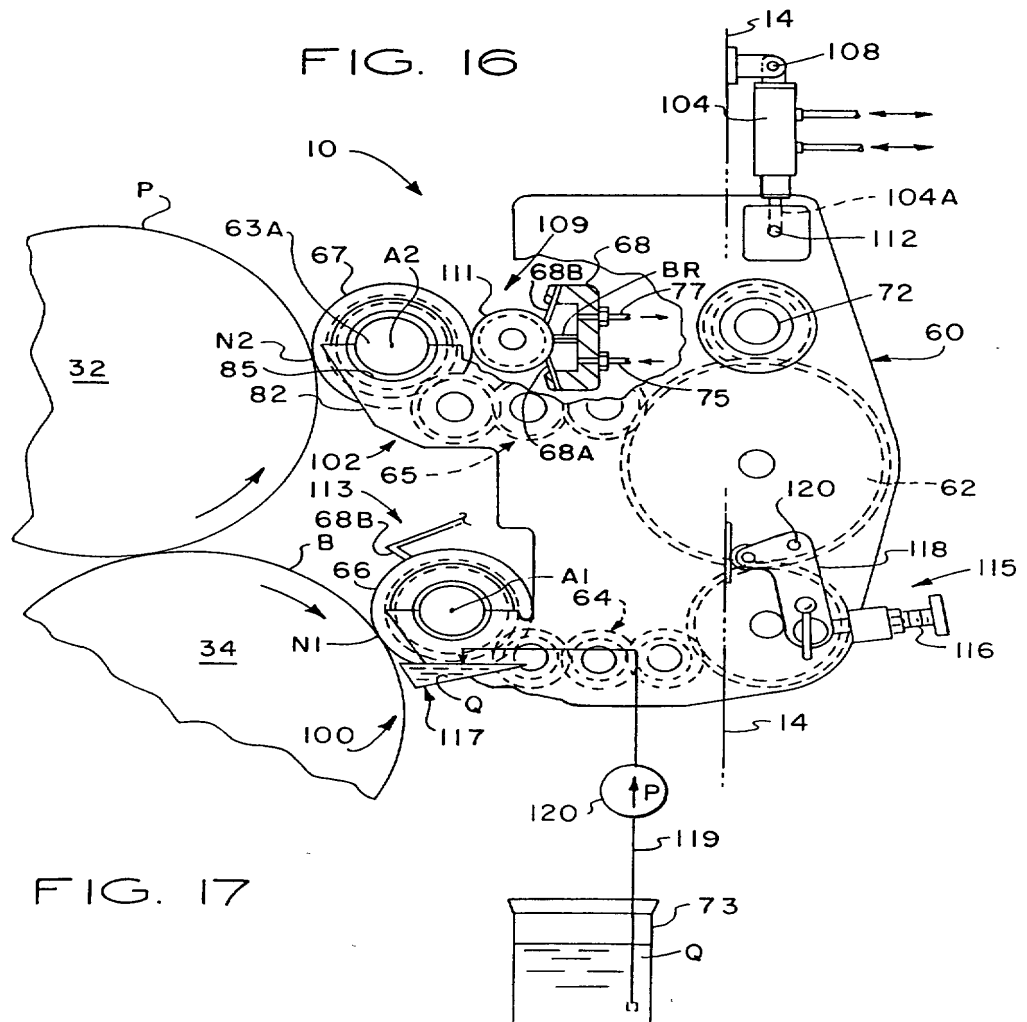


FIG. 17

HOWARD W. DEMOORE  
RONALD M. RENDLEMAN  
JOHN W. BIRD

113

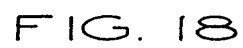


FIG. 18

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17	

Application No.: 96250217.5

Applicant : DeMoore, Howard W.

Please find the following documents enclosed:

- 3 copies of the specification, claims, abstract and drawings in EPO format.

Further, please note that applicant's family name is DeMoore, the given names being Howard W. ✓

*A. Huber*  
A. Huber  
(Association No. 1)

*Text composed, ok.*  
*Search?*  
*Documentation*

*De*

Patent Office

Field of the Invention

1           This invention relates generally to sheet-fed or web-  
2 fed, rotary offset lithographic printing presses, and more  
3 particularly, to a new and improved inking/coating apparatus for  
4 the in-line application of aqueous or flexographic printing inks,  
5 primer or protective/decorative coatings applied simultaneously to  
6 the plate and blanket of the first or any consecutive printing  
7 unit of any lithographic printing press.

8           Background of the Invention

9           Conventional sheet-fed, rotary offset printing presses  
10 typically include one or more printing units through which  
11 individual sheets are fed and printed. After the last printing  
12 unit, freshly printed sheets are transferred by a delivery  
13 conveyor to the delivery end of the press where the freshly  
14 printed and/or coated sheets are collected and stacked uniformly.  
15 In a typical sheet-fed, rotary offset printing press such as the  
16 Heidelberg Speedmaster line of presses, the delivery conveyor  
17 includes a pair of endless chains carrying gripper bars with



1 gripper fingers which grip and pull freshly printed sheets from  
2 the last impression cylinder and convey the sheets to the sheet  
3 delivery stacker.

4 . Since the inks used with sheet fed rotary offset  
5 printing presses are typically wet and tacky, special precautions  
6 must be taken to prevent marking and smearing of the freshly  
7 printed or coated sheets as the sheets are transferred from one  
8 printing unit to another. The printed ink on the surface of the  
9 sheet dries relatively slowly and is easily smeared during subse-  
10 quent transfer between printing units. Marking, smearing and  
11 smudging can be prevented by a vacuum assisted sheet transfer  
12 apparatus as described in the following U.S. Patents: 5,113,255;  
13 5,127,329; 5,205,217; 5,228,391; 5,243,909; and 5,419,254, all to  
14 Howard W. DeMoore, co-inventor, and manufactured and sold by  
15 Printing Research, Inc. of Dallas, Texas, U.S.A. under its  
16 trademark BACVAC™.

17 In some printing jobs, offsetting is prevented by  
18 applying a protective and/or decorative coating material over all  
19 or a portion of the freshly printed sheets. Some coatings are  
20 formed of a UV-curable or water-dispersed resin applied as a  
21 liquid solution over the freshly printed sheets to protect the ink  
22 from offsetting or set-off and improve the appearance of the  
23 freshly printed sheets. Such coatings are particularly desirable  
24 when decorative or protective finishes are applied in the printing  
25 of posters, record jackets, brochures, magazines, folding cartons  
26 and the like.

#### 27 Description of the Prior Art

28 Various arrangements have been made for applying the  
29 coating as an in-line printing operation by using the last  
30 printing unit of the press as the coating application unit. For  
31 example, U.S. Patents 4,270,483; 4,685,414; and 4,779,557 disclose  
32 coating apparatus which can be moved into position to permit the  
33 blanket cylinder of the last printing unit of a printing press to  
34 be used to apply a coating material over the freshly printed

1 sheets. In U.S. Patent 4,841,903 (Bird) there are disclosed  
2 coating apparatus which can be selectively moved between the plate  
3 cylinder or the blanket cylinder of the last printing unit of the  
4 press so the last printing unit can only be used for coating  
5 purposes. However, when coating apparatus of these types are  
6 being used, the last printing unit cannot be used to print ink to  
7 the sheets, but rather can only be used for the coating operation.  
8 Thus, while coating with this type of in-line coating apparatus,  
9 the printing press loses the capability of printing on the last  
10 printing unit as it is converted to a coating unit.

11 The coater of U.S. Patent 5,107,790 (Sliker et al) is  
12 retractable along an inclined rail for extending and retracting a  
13 coater head into engagement with a blanket on the blanket  
14 cylinder. Because of its size, the rail-retractable coater can  
15 only be installed between the last printing unit of the press and  
16 the delivery sheet stacker, and cannot be used for interunit  
17 coating. The coater of U.S. Patent 4,615,293 (Jahn) provides two  
18 separate, independent coaters located on the dampener side of a  
19 converted printing unit for applying lacquer to a plate and to a  
20 rubber blanket. Consequently, although a plate and blanket are  
21 provided, the coating unit of Jahn's press is restricted to a  
22 dedicated coating operation only.

23 Proposals have been made for overcoming the loss of a  
24 printing unit when in-line coating is used, for example as set  
25 forth in U.S. Patent 5,176,077 to Howard W. DeMoore (co-inventor  
26 and assignee), which discloses a coating apparatus having an  
27 applicator roller positioned to apply the coating material to the  
28 freshly printed sheet while the sheet is still on the last  
29 impression cylinder of the press. This allows the last printing  
30 unit to print and coat simultaneously, so that no loss of printing  
31 unit capability results.

32 Some conventional coaters are rail-mounted and occupy a  
33 large amount of press space and reduce access to the press.  
34 Elaborate equipment is needed for retracting such coaters from the

operative coating position to the inoperative position, which reduces access to the printing unit.

Accordingly, there is a need for an in-line inking/coating apparatus which does not result in the loss of a printing unit, does not extend the length of the press, and which can print and coat aqueous and flexographic inks and coating materials simultaneously onto the plate and blanket on any lithographic printing unit of any lithographic printing press, including the first printing unit.

#### Objects of the Invention

Accordingly, a general object of the present invention is to provide improved inking/coating apparatus which is capable of selectively applying ink or coating material to a plate on a plate cylinder or ink or coating material to a plate or blanket on a blanket cylinder.

A specific object of the present invention is to provide improved inking/coating apparatus of the character described which is extendable into inking/coating engagement with either a plate on a plate cylinder or to a plate or blanket on a blanket cylinder.

A related object of the present invention is to provide improved inking/coating apparatus of the character described which is capable of being mounted on any lithographic printing unit of the press and does not interfere with operator access to the plate cylinder, blanket cylinder, or adjacent printing units.

Another object of the present invention is to provide improved inking/coating apparatus of the character described, which can be moved from an operative inking/coating engagement position adjacent to a plate cylinder or a blanket cylinder to a non-operative, retracted position.

Still another object of the present invention is to provide improved inking/coating apparatus of the character described, which can be used for applying aqueous, flexographic and ultra-violet curable inks and/or coatings in combination with

1 lithographic, flexographic and waterless printing processes on any  
2 rotary offset printing press.

3 A related object of the present invention is to provide  
4 improved inking/coating apparatus of the character described,  
5 which is capable of applying aqueous or flexographic ink or  
6 coating material on one printing unit, for example the first  
7 printing unit, and drying the ink or coating material before it is  
8 printed or coated on the next printing unit so that it can be  
9 overprinted or overcoated immediately on the next printing unit  
10 with waterless, aqueous, flexographic or lithographic inks or  
11 coating materials.

12 Yet another object of the present invention is to  
13 provide improved inking/coating apparatus for use on a multiple  
14 color rotary offset printing press that can apply ink or coating  
15 material separately and/or simultaneously to the plate and/or  
16 blanket of a printing unit of the press from a single operative  
17 position, and from a single inking/coating apparatus.

18 A related object of the present invention is to provide  
19 improved inking/coating apparatus of the character described, in  
20 which virtually no printing unit adjustment or alteration is  
21 required when the inking/coating apparatus is converted from plate  
22 to blanket printing or coating and vice versa.

23 Another object of the present invention is to provide  
24 improved inking/coating apparatus that can be operably mounted in  
25 the dampener space of any lithographic printing unit for ink-  
26 ing/coating engagement with either a plate on a plate cylinder or  
27 a plate or blanket on a blanket cylinder, and which does not  
28 interfere with operator movement or activities in the interunit  
29 space between printing units.

#### 30 Summary of the Invention

31 The foregoing objects are achieved by a retractable, in-  
32 line inking/coating apparatus which is mounted on the dampener  
33 side of any printing unit of a rotary offset press for movement  
34 between an operative (on-impression) inking/coating position and

1 a retracted, disengaged (off-impression) position. The ink-  
2 ing/coating apparatus includes an applicator roller which is  
3 movable into and out of engagement with a plate on a plate  
4 cylinder or a blanket on a blanket cylinder. The inking/coating  
5 applicator head is pivotally coupled to a printing unit by pivot  
6 pins which are mounted on the press side frames in the traditional  
7 dampener space of the printing unit in parallel alignment with the  
8 plate cylinder and the blanket cylinder. This dampener space  
9 mounting arrangement allows the inking/coating unit to be  
10 installed between any adjacent printing units on the press.

11 In the preferred embodiment, the applicator head  
12 includes vertically spaced pairs of cradle members with one cradle  
13 pair being adapted for supporting an inking/coating applicator  
14 roller in alignment with a plate cylinder, and the other cradle  
15 pair supporting an inking/coating applicator roller in alignment  
16 with the blanket cylinder, respectively, when the applicator head  
17 is in the operative position. Because of the pivotal support  
18 provided by the pivot pins, the applicator head can be extended  
19 and retracted within the limited space available in the tradition-  
20 al dampener space, without restricting operator access to the  
21 printing unit cylinders and without causing a printing unit to  
22 lose its printing capability.

23 When the inking/coating apparatus is used in combination  
24 with a flexographic printing plate and aqueous or flexographic ink  
25 or coating material, the water component of the aqueous or  
26 flexographic ink or coating material on the freshly printed or  
27 coated sheet is evaporated and dried by a high velocity, hot air  
28 interunit dryer and a high volume heat and moisture extractor  
29 assembly so that the freshly printed ink or coating material is  
30 dry before the sheet is printed or coated on the next printing  
31 unit. This quick drying process permits a base layer or film of  
32 ink, for example opaque white or metallic (gold, silver or other  
33 metallics) ink to be printed on the first printing unit, and then  
34 overprinted on the next printing unit without back-trapping or dot  
35 gain.

1           The construction and operation of the present invention  
2 will be understood from the following detailed description taken  
3 in conjunction with the accompanying drawings which disclose, by  
4 way of example, the principles and advantages of the present  
5 invention.

6       Brief Description of the Drawings

7           FIGURE 1 is a perspective view of a sheet fed, rotary  
8 offset printing press having inking/coating apparatus embodying  
9 the present invention;

10          FIGURE 2 is a simplified perspective view of the single  
11 head, dual cradle inking/coating apparatus of the present  
12 invention;

13          FIGURE 3 is a schematic side elevational view of the  
14 printing press of Figure 1 having single head, dual cradle ink-  
15 ing/coating apparatus installed in the traditional dampener  
16 position of the first, second and last printing units;

17          FIGURE 4 is a simplified side elevational view showing  
18 the single head, dual cradle inking/coating apparatus in the  
19 operative inking/coating position for simultaneously printing on  
20 the printing plate and blanket on the fourth printing unit;

21          FIGURE 5 is a simplified side elevational view showing  
22 the single head, dual cradle inking/coating apparatus in the  
23 operative position for spot or overall inking or coating on the  
24 blanket of the first printing unit, and showing the dual cradle  
25 inking/coating apparatus in the operative position for spot or  
26 overall inking or coating on the printing plate of the second  
27 printing unit;

28          FIGURE 6 is a simplified side elevational view of the  
29 single head, dual cradle inking/coating apparatus of FIGURE 4 and  
30 FIGURE 5, partially broken away, showing the single head, dual  
31 cradle inking/coating apparatus in the operative coating position  
32 and having a sealed doctor blade reservoir assembly for spot or  
33 overall coating on the blanket;

1           FIGURE 7 is a schematic view showing a heat exchanger  
2 and pump assembly connected to the single head, dual cradle  
3 inking/coating apparatus for circulating temperature controlled  
4 ink or coating material to the inking/coating apparatus;

5           FIGURE 8 is a side elevational view, partially broken  
6 away, and similar to FIGURE 6 which illustrates an alternative  
7 coating head arrangement;

8           FIGURE 9 is a simplified elevational view of a printing  
9 unit which illustrates pivotal coupling of the inking/coating  
10 apparatus on the printing unit side frame members;

11           FIGURE 10 is a view similar to FIGURE 2 in which a pair  
12 of split applicator rollers are mounted in the upper cradle and  
13 lower cradle, respectively;

14           FIGURE 11 is a side elevational view of a split applica-  
15 tor roller;

16           FIGURE 12 is a perspective view of a doctor blade  
17 reservoir which is centrally partitioned by a seal element;

18           FIGURE 13 is a sectional view showing sealing engagement  
19 of the split applicator roller against the partition seal element  
20 of FIGURE 12;

21           FIGURE 14 is a view similar to FIGURE 8 which illus-  
22 trates an alternative inking/coating embodiment;

23           FIGURE 15 is a simplified side elevational view of a  
24 substrate which has a bronzed-like finish which is applied by  
25 simultaneous operation of the dual applicator roller embodiment of  
26 FIGURE 14;

27           FIGURE 16 is a side elevational view, partly in section,  
28 of a pan roller having separate transfer surfaces mounted on a  
29 split fountain pan;

30           FIGURE 17 is a simplified side elevational view of the  
31 dual cradle inking/coating apparatus, partially broken away, which  
32 illustrates an alternative inking/coating head apparatus featuring  
33 a single doctor blade assembly, anilox applicator roller mounted  
34 on the lower cradle; and

FIGURE 18 is a side elevational view, partly in section, of a single doctor blade anilox applicator roller assembly having separate transfer surfaces, and a split fountain pan having separate fountain compartments, with the separate fountain compartments being supplied with different inks or coating materials from separate off-press sources.

#### Detailed Description of the Preferred Embodiments

As used herein, the term "processed" refers to printing and coating methods which can be applied to either side of a substrate, including the application of lithographic, waterless, UV-curable, aqueous and flexographic inks and/or coatings. The term "substrate" refers to sheet and web material. Also, as used herein, the term "waterless printing plate" refers to a printing plate having image areas and non-image areas which are oleophilic and oleophobic, respectively. "Waterless printing ink" refers to an oil-based ink which does not contain a significant aqueous component. "Flexographic plate" refers to a flexible printing plate having a relief surface which is wettable by flexographic ink or coating material. "Flexographic printing ink or coating material" refers to an ink or coating material having a base constituent of either water, solvent or UV-curable liquid. "UV-curable lithographic printing ink and coating material" refers to oil-based printing inks and coating materials that can be cured (dried) photomechanically by exposure to ultraviolet radiation, and that have a semi-paste or gel-like consistency. "Aqueous printing ink or coating material" refers to an ink or coating material that predominantly contains water as a solvent, diluent or vehicle. A "relief plate" refers to a printing plate having image areas which are raised relative to non-image areas which are recessed.

As shown in the exemplary drawings, the present invention is embodied in a new and improved in-line inking/coating apparatus, herein generally designated 10, for applying aqueous, flexographic or UV-curable inks or protective and/or decorative



1 coatings to sheets or webs printed in a sheet-fed or web-fed,  
2 rotary offset printing press, herein generally designated 12. In  
3 this instance, as shown in FIGURE 1, the inking/coating apparatus  
4 10 is installed in a four unit rotary offset printing press 12,  
5 such as that manufactured by Heidelberger Druckmaschinen AG of  
6 Germany under its designation Heidelberg Speedmaster SM102 (40",  
7 102cm).

8 The press 12 includes a press frame 14 coupled at one  
9 end, herein the right end, to a sheet feeder 16 from which sheets,  
10 herein designated S, are individually and sequentially fed into  
11 the press, and at the opposite end, with a sheet delivery stacker  
12 20 in which the freshly printed sheets are collected and stacked.  
13 Interposed between the sheet feeder 16 and the sheet delivery  
14 stacker 20 are four substantially identical sheet printing units  
15 22, 24, 26 and 28 which can print four different colors onto the  
16 sheets as they are transferred through the press 12. The printing  
17 units are housed within printing towers T1, T2, T3 and T4 formed  
18 by side frame members 14, 15. Each printing tower has a delivery  
19 side 25 and a dampener side 27. A dampener space 29 is partially  
20 enclosed by the side frames on the dampener side of the printing  
21 unit.

22 As illustrated, the printing units 22, 24, 26 and 28 are  
23 substantially identical and of conventional design. The first  
24 printing unit 22 includes an in-feed transfer cylinder 30, a plate  
25 cylinder 32, a blanket cylinder 34 and an impression cylinder 36,  
26 all supported for rotation in parallel alignment between the press  
27 side frames 14, 15 which define printing unit towers T1, T2, T3  
28 and T4. Each of the first three printing units 22, 24 and 26 have  
29 a transfer cylinder 38 disposed to transfer the freshly printed  
30 sheets from the adjacent impression cylinder and transfer the  
31 freshly printed sheets to the next printing unit via an intermedi-  
32 ate transfer drum 40.

33 The last printing unit 28 includes a delivery cylinder  
34 42 mounted on a delivery shaft 43. The delivery cylinder 42  
35 supports the freshly printed sheet 18 as it is transferred from

1 the last impression cylinder 36 to a delivery conveyor system,  
2 generally designated 44, which transfers the freshly printed sheet  
3 to the sheet delivery stacker 20. To prevent smearing during  
4 transfer, a flexible covering is mounted on the delivery cylinder  
5 42, as described and claimed in U.S. Patent 4,402,267 to Howard W.  
6 DeMoore, which is incorporated herein by reference. The flexible  
7 covering is manufactured and sold by Printing Research, Inc. of  
8 Dallas, Texas, U.S.A., under its trademark SUPER BLUE®. Optional-  
9 ly, a vacuum-assisted sheet transfer assembly manufactured and  
10 sold by Printing Research, Inc. of Dallas, Texas, U.S.A., under  
11 its trademark BACVAC® can be substituted for the delivery transfer  
12 cylinder 42 and flexible covering.

13 The delivery conveyor system 44 as shown in FIGURE 2 is  
14 of conventional design and includes a pair of endless delivery  
15 gripper chains 46, only one of which is shown carrying at regular  
16 spaced locations along the chains, laterally disposed gripper bars  
17 having gripper fingers used to grip the leading edge of a freshly  
18 printed or coated sheet 18 after it leaves the nip between the  
19 impression cylinder 36 and delivery cylinder 42 of the last  
20 printing unit 28. As the leading edge is gripped by the gripper  
21 fingers, the delivery chains 46 pull the sheet away from the last  
22 impression cylinder 36 and convey the freshly printed or coated  
23 sheet to the sheet delivery stacker 20.

24 Prior to reaching the delivery sheet stacker, the  
25 freshly printed and/or coated sheets S pass under a delivery dryer  
26 48 which includes a combination of infra-red thermal radiation,  
27 high velocity hot air flow and a high performance heat and  
28 moisture extractor for drying the ink and/or the protec-  
29 tive/decorative coating. Preferably, the delivery dryer 48,  
30 including the high performance heat and moisture extractor is  
31 constructed as described in U.S. Application Serial Number  
32 08/116,711, filed September 3, 1993, entitled "Infra-Red Forced  
33 Air Dryer and Extractor" by Howard C. Secor, Ronald M. Rendleman  
34 and Paul D. Copenhaver, commonly assigned to the assignee of the  
35 present invention, Howard W. DeMoore, and licensed to Printing

1 Research, Inc. of Dallas, Texas, U.S.A., which manufactures and  
2 markets the delivery dryer 48 under its trademark AIR BLANKET™.

3 In the exemplary embodiment shown in FIGURE 3, the first  
4 printing unit 22 has a flexographic printing plate PF mounted on  
5 the plate cylinder, and therefore neither an inking roller train  
6 nor a dampening system is required. A flexographic printing plate  
7 PF is also mounted on the plate cylinder of the second printing  
8 unit 24. The form rollers of the inking roller train 52 shown  
9 mounted on the second printing unit 24 are retracted and locked  
10 off to prevent plate contact. Flexographic ink is supplied to the  
11 flexographic plate PF of the second printing unit 24 by the ink-  
12 ing/coating apparatus 10.

13 A suitable flexographic printing plate PF is offered by  
14 E.I. du Pont de Nemours of Wilmington, Delaware, U.S.A., under its  
15 trademark CYREL®. Another source is BASF Aktiengesellschaft of  
16 Ludwigshafen, Germany, which offers a suitable flexographic  
17 printing plate under its trademark NYLOFLEX®.

18 The third printing unit 26 as illustrated in FIGURE 3  
19 and FIGURE 4 is equipped for lithographic printing and includes an  
20 inking apparatus 50 having an inking roller train 52 arranged to  
21 transfer ink Q from an ink fountain 54 to a lithographic plate P  
22 mounted on the plate cylinder 32. This is accomplished by a  
23 fountain roller 56 and a ductor roller 57. The fountain roller 56  
24 projects into the ink fountain 54, whereupon its surface picks up  
25 ink. The lithographic printing ink Q is transferred from the  
26 fountain roller 56 to the inking roller train 52 by the ductor  
27 roller 57. The inking roller train 52 supplies ink Q to the image  
28 areas of the lithographic printing plate P.

29 The lithographic printing ink Q is transferred from the  
30 lithographic printing plate P to an ink receptive blanket B which  
31 is mounted on the blanket cylinder 34. The inked image carried on  
32 the blanket B is transferred to a substrate S as the substrate is  
33 transferred through the nip between the blanket cylinder 34 and  
34 the impression cylinder 36.

1           The inking roller arrangement 52 illustrated in FIGURE  
2   3 and FIGURE 4 is exemplary for use in combination with litho-  
3   graphic ink printing plates P. It is understood that a dampening  
4   system 58 having a dampening fluid reservoir DF is coupled to the  
5   inking roller train 52 (FIGURE 4), but is not required for water-  
6   less or flexographic printing.

7           The plate cylinder 32 of printing unit 28 is equipped  
8   with a waterless printing plate PW. Waterless printing plates are  
9   also referred to as dry planographic printing plates and are  
10   disclosed in the following U.S. patents: 3,910,187; Re. 30,670;  
11   4,086,093; and 4,853,313. Suitable waterless printing plates can  
12   be obtained from Toray Industries, Inc. of Tokyo, Japan. A  
13   dampening system is not used for waterless printing, and waterless  
14   (oil-based) printing ink is used. The waterless printing plate PW  
15   has image areas and non-image areas which are oleophilic/hydro-  
16   philic and oleophobic/hydrophobic, respectively. The waterless  
17   printing plate PW is engraved or etched, with the image areas  
18   being recessed with respect to the non-image areas. The image  
19   area of the waterless printing plate PW is rolled-up with the  
20   flexographic or aqueous printing ink which is transferred by the  
21   applicator roller 66. Both aqueous and oil-based inks and  
22   coatings are repelled from the non-image areas, and are retained  
23   in the image areas. The printing ink or coating is then trans-  
24   ferred from the image areas to an ink or coating receptive blanket  
25   B and is printed or coated onto a substrate S.

26           For some printing jobs, a flexographic plate PF or a  
27   waterless printing plate PW is mounted over a resilient packing  
28   such as the blanket B on the blanket cylinder 34, for example as  
29   indicated by phantom lines in printing unit 22 of FIGURE 5. An  
30   advantage of this alternative embodiment is that the waterless  
31   plate PW or the flexographic plate PF are resiliently supported  
32   over the blanket cylinder by the underlying blanket B or other  
33   resilient packing. The radial deflection and give of the  
34   resilient blanket B provides uniform, positive engagement between

1 the applicator roller 66 and a flexographic plate or waterless  
2 plate.

3 In that arrangement, a plate is not mounted on the plate  
4 cylinder 32; instead, a waterless plate PW is mounted on the  
5 blanket cylinder, and the inked image on the waterless printing  
6 plate is not offset but is instead transferred directly from the  
7 waterless printing plate PW to the substrate S. The water  
8 component of flexographic ink on the freshly printed sheet is  
9 evaporated by high velocity, hot air dryers and high volume heat  
10 and moisture extractors so that the freshly printed aqueous or  
11 flexographic ink is dried before the substrate is printed on the  
12 next printing unit.

13 Referring now to FIGURE 2, FIGURE 3 and FIGURE 9, the  
14 inking/coating apparatus 10 is pivotally mounted on the side  
15 frames 14, 15 for rotation about an axis X. The inking/coating  
16 apparatus 10 includes a frame 60, a hydraulic motor 62, a lower  
17 gear train 64, an upper gear train 65, an applicator roller 66, a  
18 sealed doctor blade assembly 68 (FIGURE 6), and a drip pan DP, all  
19 mounted on the frame 60. The external peripheral surface of the  
20 applicator roller 66 is wetted by contact with liquid coating  
21 material or ink contained in a reservoir 70.

22 The hydraulic motor 62 drives the applicator roller 66  
23 synchronously with the plate cylinder 32 and the blanket cylinder  
24 34 in response to an RPM control signal from the press drive (not  
25 illustrated) and a feedback signal developed by a tachometer 72.  
26 While a hydraulic drive motor is preferred, other drive means such  
27 as an electric drive motor or an equivalent can be used.

28 When using waterless printing plate systems, the  
29 temperature of the waterless printing ink and of the waterless  
30 printing plate must be closely controlled for good image reproduc-  
31 tion. For example, for waterless offset printing with TORAY  
32 waterless printing plates PW, it is absolutely necessary to  
33 control the waterless printing plate surface and waterless ink  
34 temperature to a very narrow range, for example 24°C (75°F) to  
35 27°C (80°F).

1 Referring to FIGURE 7, the reservoir 70 is supplied with  
2 ink or coating which is temperature controlled by a heat exchanger  
3 71. The temperature controlled ink or coating material is  
4 circulated by a positive displacement pump, for example a  
5 peristaltic pump, through the reservoir 70 and heat exchanger 71  
6 from a source 73 through a supply conduit 75 and a return conduit  
7 77. The heat exchanger 71 cools or heats the ink or coating  
8 material and maintains the ink or coating and the printing plate  
9 within the desired narrow temperature range.

10 According to one aspect of the present invention,  
11 aqueous/flexographic ink or coating material is supplied to the  
12 applicator roller 66, which transfers the aqueous/flexographic ink  
13 or coating material to the printing plate (FIGURE 7), which may be  
14 a waterless printing plate or a flexographic printing plate. When  
15 the inking/coating apparatus is used for applying aqueous/flexo-  
16 graphic ink or coating material to a waterless printing plate PW,  
17 the inking roller train 52 is not required, and is retracted away  
18 from the printing plate. Because the viscosity of aqueous/flexo-  
19 graphic printing ink or coating material varies with temperature,  
20 it is necessary to heat or cool the aqueous/flexographic printing  
21 ink or coating material to compensate for ambient temperature  
22 variations to maintain the ink viscosity in a preferred operating  
23 range.

24 For example, the temperature of the printing press can  
25 vary from around 60°F (15°C) in the morning, to around 85°F (29°C)  
26 or more in the afternoon. The viscosity of aqueous/flexographic  
27 printing ink or coating material can be marginally high when the  
28 ambient temperature of the press is near 60°F (15°C), and the  
29 viscosity can be marginally low when the ambient temperature of  
30 the press exceeds 85°F (29°C). Consequently, it is desirable to  
31 control the temperature of the aqueous/flexographic printing ink  
32 or coating material so that it will maintain the surface tempera-  
33 ture of waterless printing plates within the specified temperature  
34 range. Moreover, the ink/coating material temperature should be  
35 controlled to maintain the tack of the aqueous/flexographic

1 printing ink or coating material within a desired range when the  
2 ink or coating material is being used in connection with flexo-  
3 graphic printing processes.

4 The applicator roller 66 is preferably an anilox fluid  
5 metering roller which transfers measured amounts of printing ink  
6 or coating material to a plate or blanket. The surface of an  
7 anilox roller is engraved with an array of closely spaced, shallow  
8 depressions referred as "cells". Ink or coating from the  
9 reservoir 70 flows into the cells as the anilox roller turns  
10 through the reservoir. The transfer surface of the anilox roller  
11 is "doctored" (wiped or scraped) by dual doctor blades 68A, 68B to  
12 remove excess ink or coating material. The ink or coating metered  
13 by the anilox roller is that contained within the cells. The dual  
14 doctor blades 68A, 68B also seal the supply reservoir 70.

15 The anilox applicator roller 66 is cylindrical and may  
16 be constructed in various diameters and lengths, containing cells  
17 of various sizes and shapes. The volumetric capacity of an anilox  
18 roller is determined by cell size, shape and number of cells per  
19 unit area. Depending upon the intended application, the cell  
20 pattern may be fine (many small cells per unit area) or coarse  
21 (fewer large cells per unit area).

22 By supplying the ink or coating material through the  
23 inking/coating apparatus 10, more ink or coating material can be  
24 applied to the sheet S as compared with the inking roller train of  
25 a lithographic printing unit. Moreover, color intensity is  
26 stronger and more brilliant because the aqueous or flexographic  
27 ink or coating material is applied at a much heavier film  
28 thickness or weight than can be applied by the lithographic  
29 process, and the aqueous or flexographic colors are not diluted by  
30 dampening solution.

31 Preferably, the sealed doctor blade assembly 68 is con-  
32 structed as described in U.S. Patent 5,176,077 to Howard W.  
33 DeMoore, co-inventor and assignee, which is incorporated herein by  
34 reference. An advantage of using a sealed reservoir is that fast  
35 drying ink or coating material can be used. Fast drying ink or

coating material can be used in an open fountain 53 (see FIGURE 8); however, open air exposure causes the water and solvents in the fast-drying ink or coating material to evaporate faster, thus causing the ink or coating material to dry prematurely and change viscosity. Moreover, an open fountain emits unwanted odors into the press room. When the sealed doctor blade assembly is utilized, the pump (FIGURE 7) which circulates ink or coating material to the doctor blade head is preferably a peristaltic pump, which does not inject air into the feeder lines which supply the ink or coating reservoir 70 and helps to prevent the formation of air bubbles and foam within the ink or coating material.

An inking/coating apparatus 10 having an alternative applicator roller arrangement is illustrated in FIGURES 10-13. In this arrangement, the engraved metering surface of the anilox applicator rollers 66, 67 are partitioned by smooth seal surfaces 66C which separates a first engraved peripheral surface portion 66A from a second engraved peripheral surface portion 66B. Likewise, smooth seal surfaces 66D, 66E are formed on the opposite end portions of the applicator roller 66 for engaging end seals 134, 136 (FIGURE 12) of the doctor blade reservoir. The upper applicator roller 67 has engraved anilox metering surfaces 67A and 67B which are separated by a smooth seal band 67C.

Referring now to FIGURE 12 and FIGURE 13, the reservoir 70 of the doctor blade head 68 is partitioned by a curved seal element 130 to form two separate chambers 70A, 70B. The seal element 130 is secured to the doctor blade head within an annular groove 132. The seal element 130 is preferably made of polyurethane foam or other durable, resilient foam material. The seal element 130 is engaged by the seal band 66, thus forming a rotary seal which blocks the leakage of ink or coating material from one reservoir chamber into the other reservoir chamber. Moreover, the seal band provides an unprinted or uncoated area which separates the printed or coated areas from each other, which is needed for work and turn printing jobs or other printing jobs which print two or more separate images onto the same substrate.



1 Another advantage of the split applicator roller  
2 embodiment is that it enables two or more flexographic inks or  
3 coating materials to be printed simultaneously within the same  
4 lithographic printing unit. That is, the reservoir chambers 70A,  
5 70B of the upper doctor blade assembly can be supplied with gold  
6 ink and silver ink, for example, while the reservoir chambers 70A,  
7 70B of the lower doctor blade assembly can be supplied with inks  
8 of two additional colors, for example opaque white ink and blue  
9 ink. This permits the opaque white ink to be overprinted with the  
10 gold ink, and the blue ink to be overprinted with the silver ink  
11 on the same printing unit on any lithographic press.

12 Moreover, a catalyst can be used in the upper doctor  
13 blade reservoir and a reactive ink or coating material can be used  
14 in the lower doctor blade reservoir. This can provide various  
15 effects, for example improved chemical resistance and higher gloss  
16 levels.

17 The split applicator roller sections 67A, 67B in the  
18 upper cradle position can be used for applying two separate inks  
19 or coating materials simultaneously, for example flexographic,  
20 aqueous and ultra-violet curable inks or coating materials, to  
21 separate surface areas of the plate, while the lower applicator  
22 roller sections 66A, 66B can apply an initiator layer and a micro-  
23 encapsulated layer simultaneously to separate blanket surface  
24 areas. Optionally, the metering surface portions 66A, 66B can be  
25 provided with different cell metering capacities for providing  
26 different printing effects which are being printed simultaneously.  
27 For example, the screen line count on one half-section of an  
28 anilox applicator roller is preferably in the range of 200-600  
29 lines per inch (79-236 lines per cm) for half-tone images, and the  
30 screen line count of the other half-section is preferably in the  
31 range of 100-300 lines per inch (39-118 lines per cm) for overall  
32 coverage, high weight applications such as opaque white. This  
33 split arrangement in combination with dual applicator rollers is  
34 particularly advantageous when used in connection with "work and  
35 turn" printing jobs.

Referring again to FIGURE 8, instead of using the sealed doctor blade reservoir assembly 68 as shown in FIGURE 6, an open fountain assembly 69 is provided by the fountain pan 53 which contains a volume of liquid ink Q or coating material. The liquid ink or coating material is transferred to the applicator roller 66 by a pan roller 55 which turns in contact with ink Q or coating material in the fountain pan. If a split applicator roller is used, the pan roller 55 is also split, and the pan is divided into two pan sections 53A, 53B by a separator plate 53P, as shown in FIGURE 16.

In the alternative embodiment of FIGURE 16, the pan roller 55 is divided into two pan roller sections 55A, 55B by a centrally located, annular groove 59. The separator plate 53P is received within and centrally aligned with the groove 59, but does not touch the adjoining roller faces. By this arrangement, two or more inks or coating materials Q1, Q2 are contained within the open pan sections 55A, 55B for transfer by the split pan roller sections 53A, 53B, respectively. This permits two or more flexographic inks or coating materials to be transferred to two separate image areas on the plate or on the blanket of the same printing unit. This arrangement is particularly advantageous for work and turn printing jobs or other printing jobs which print two or more separate images onto the same substrate.

The frame 60 of the inking/coating apparatus 10 includes side support members 74, 76 which support the applicator roller 66, gear train 64, gear train 65, doctor blade assembly 68 and the drive motor 62. The applicator roller 66 is mounted on stub shafts 63A, 63B which are supported at opposite ends on a lower cradle assembly 100 formed by a pair of side support members 78, 80 which have sockets 79, 81 and retainer caps 101, 103. The stub shafts are received in roller bearings 105, 107 which permit free rotation of the applicator roller 66 about its longitudinal axis A1 (axis A2 in the upper cradle). The retainer caps 101, 103 hold the stub shafts 63A, 63B and bearings 105, 107 in the sockets 79,

81 and hold the applicator roller 66 in parallel alignment with the pivot axis X.

The side support members 74, 76 also have an upper cradle assembly 102 formed by a pair of side support members 82, 84 which are vertically spaced with respect to the lower side plates 78, 80. Each cradle 100, 102 has a pair of sockets 79, 81 and 83, 85, respectively, for holding an applicator roller 66, 67 for spot coating or inking engagement with the printing plate P on the plate cylinder 32 (FIGURE 4) or with a printing plate P or a blanket B on the blanket cylinder 34.

Preferably, the applicator roller 67 (FIGURE 8, FIGURE 9) the upper cradle (plate) position is an anilox roller having a resilient transfer surface. In the dual cradle arrangement as shown in FIGURE 2, the press operator can quickly change from blanket inking/coating to plate inking/coating within minutes, since it is only necessary to release, remove and reposition or replace the applicator roller 66.

The capability to simultaneously print in the flexographic mode, the aqueous mode, the waterless mode, or the lithographic mode on different printing units of the same lithographic press and to print or coat from either the plate position or the blanket position on any one of the printing units is referred to herein as the LITHOFLEX™ printing process or system. LITHOFLEX™ is a trademark of Printing Research, Inc. of Dallas, Texas, U.S.A., exclusive licensee of the present invention.

Referring now to FIGURE 14, an inking/coating apparatus 10 having an inking/coating assembly 109 of an alternative design is installed in the upper cradle position for applying ink and/or coating material to a plate P on the plate cylinder 32. According to this alternative embodiment, an applicator roller 67R having a resilient transfer surface is coupled to an anilox fluid metering roller which transfers measured amounts of printing ink or coating material to the plate P. The anilox roller 111 has a transfer surface constructed of metal, ceramic or composite material which is engraved with cells. The resilient applicator roller 67R is

1 interposed in transfer engagement with the plate P and the  
2 metering surface of the anilox roller 111. The resilient transfer  
3 surface of the applicator roller 67R provides uniform, positive  
4 engagement with the plate.

5 Referring now to FIGURE 17, an inking/coating apparatus  
6 10 having an alternative inking/coating assembly 113 is installed  
7 in the lower cradle assembly 100 for applying flexographic or  
8 aqueous ink and/or coating material Q to a plate or blanket  
9 mounted on the blanket cylinder 34. Instead of using the sealed,  
10 dual doctor blade reservoir assembly 68 as shown in FIGURE 6, an  
11 open, single doctor blade anilox roller assembly 113 is supplied  
12 with liquid ink Q or coating material contained in an open  
13 fountain-pan 117. The liquid ink or coating material Q is  
14 transferred to the engraved transfer surface of the anilox roller  
15 66 as it turns in the fountain pan 117. Excess ink or coating  
16 material Q is removed from the engraved transfer surface by a  
17 single doctor blade 68B. The liquid ink or coating material Q is  
18 pumped from an off-press source, for example the drum 73 shown in  
19 FIGURE 17, through a supply conduit 119 into the fountain pan 117  
20 by a pump 120.

21 For overall inking or coating jobs, the metering  
22 transfer surface of the anilox roller 66 extends over its entire  
23 peripheral surface. However, for certain printing jobs which  
24 print two or more separate images onto the same substrate, for  
25 example work and turn printing jobs, the metering transfer surface  
26 of the anilox applicator roller 66 is partitioned by a centrally  
27 located, annular undercut groove 66C which separates first and  
28 second metering transfer surfaces 66A, 66B as shown in FIGURE 11  
29 and FIGURE 18.

30 The single doctor blade 68B has an edge 68E which wipes  
31 simultaneously against the split metering transfer surfaces 66A,  
32 66B. In this single blade, split anilox roller embodiment 113, it  
33 is necessary to provide dual supply sources, for example drums  
34 73A, 73B, dual supply lines 119A, 119B, and dual pumps 120A, 120B.  
35 Moreover, the fountain pan 117 is also split, and the pan 117 is

1 divided into two pan sections 117A, 117B by a separator plate 121,  
2 as shown in FIGURE 18. The separator plate 121 is centrally  
3 aligned with the undercut groove 66C, but does not touch the  
4 adjoining roller faces.

5 Although the single blade, split anilox applicator  
6 roller assembly 113 is shown mounted in the lower cradle position  
7 (FIGURE 17), it should be understood that the single blade, split  
8 anilox applicator roller assembly 113 can be mounted and used in  
9 the upper cradle position, as well.

10 According to another aspect of the present invention,  
11 the inking/coating apparatus 10 is pivotally coupled on horizontal  
12 pivot pins 88P, 90P which allows the single head, dual cradle ink-  
13 ing/coating apparatus 10 to be mounted on any lithographic  
14 printing unit. Referring to FIGURE 9, the horizontal pivot pins  
15 88P, 90P are mounted within the traditional dampener space 29 of  
16 the printing unit and are secured to the press side frames 14, 15,  
17 respectively. Preferably, the pivot support pins 88P, 90P are  
18 secured to the press side frames by a threaded fastener. The  
19 pivot support pins are received within circular openings 88, 90  
20 which intersect the side support members 74, 76 of the ink-  
21 ing/coating apparatus 10. The horizontal support pins 88P, 90P  
22 are disposed in parallel alignment with rotational axis X and with  
23 the plate cylinder and blanket cylinder, and are in longitudinal  
24 alignment with each other.

25 Preferably, the pivot pins 88P, 90P are located in the  
26 dampener space 29 so that the rotational axes A1, A2 of the  
27 applicator rollers 66, 67 are elevated with respect to the nip  
28 contact points N1, N2. By that arrangement, the transfer point  
29 between the applicator roller 66 and a blanket on the blanket  
30 cylinder 34 (as shown in FIGURE 8) and the transfer point between  
31 the applicator roller 66 and a plate on the plate cylinder 32 (as  
32 shown in FIGURE 5) are above the radius lines R1, R2 of the plate  
33 cylinder and the blanket cylinder, respectively. This permits the  
34 inking/coating apparatus 10 to move clockwise to retract the  
35 applicator roller 66 to an off-impression position relative to the

1 blanket cylinder in response to a single extension stroke of the  
2 power actuator arms 104A, 106A. Similarly, the applicator roller  
3 66 is moved counterclockwise to the on-impression operative  
4 position, as shown in FIGURES 4, 5, 6 and 8 by a single retraction  
5 stroke of the actuator arms 104A, 106A, respectively.

6 Preferably, the pivot pins are made of steel and the  
7 side support members are made of aluminum, with the steel pivot  
8 pins and the aluminum collar portion bordering the circular  
9 openings 88, 90 forming a low friction journal. By this arrange-  
10 ment, the inking/coating apparatus 10 is freely rotatable  
11 clockwise and counterclockwise with respect to the pivot pins 88P,  
12 90P. Typically, the arc length of rotation is approximately 60  
13 mils (about 1.5 mm). Consequently, the inking/coating apparatus  
14 10 is almost totally enclosed within the dampener space 29 of the  
15 printing unit in the on-impression position and in the off-  
16 impression position.

17 The cradle assemblies 100 and 102 position the applica-  
18 tor roller 66 in inking/coating alignment with the plate cylinder  
19 or blanket cylinder, respectively, when the inking/coating  
20 apparatus 10 is extended to the operative (on-impression)  
21 position. Moreover, because the inking/coating apparatus 10 is  
22 installed within the dampener space 29, it is capable of freely  
23 rotating through a small arc while extending and retracting  
24 without being obstructed by the press side frames or other parts  
25 of the printing press. This makes it possible to install the ink-  
26 ing/coating apparatus 10 on any lithographic printing unit.  
27 Moreover, because of its internal mounting position within the  
28 dampener space 29, the projection of the inking/coating apparatus  
29 10 into the space between printing units is minimal. This assures  
30 unrestricted operator access to the printing unit when the  
31 applicator head is in the operative (on-impression) and retracted  
32 (off-impression) positions.

33 As shown in FIGURE 4 and FIGURE 5, movement of the  
34 inking/coating apparatus 10 is counterclockwise from the retracted

1 (off-impression) position to the operative (on-impression)  
2 position.

3 Although the dampener side installation is preferred,  
4 the inking/coating apparatus 10 can be adapted for operation on  
5 the delivery side of the printing unit, with the inking/coating  
6 apparatus being movable from a retracted (off-impression) position  
7 to an on-impression position for engagement of the applicator  
8 roller with either a plate on the plate cylinder or a blanket on  
9 the blanket cylinder on the delivery side 25 of the printing unit.

10 Movement of the inking/coating apparatus 10 to the  
11 operative (on-impression) position is produced by power actuators,  
12 preferably double acting pneumatic cylinders 104, 106 which have  
13 extendable/retractable power transfer arms 104A, 106A, respective-  
14 ly. The first pneumatic cylinder 104 is pivotally coupled to the  
15 press frame 14 by a pivot pin 108, and the second pneumatic  
16 cylinder 106 is pivotally coupled to the press frame 15 by a pivot  
17 pin 110. In response to selective actuation of the pneumatic  
18 cylinders 104, 106, the power transfer arms 104A, 106A are  
19 extended or retracted. The power transfer arm 104A is pivotally  
20 coupled to the side support member 74 by a pivot pin 112.  
21 Likewise, the power transfer arm 106A is pivotally coupled to the  
22 side support member 76 by a pivot pin 114.

23 As the power arms extend, the inking/coating apparatus  
24 10 is rotated clockwise on the pivot pins 88P, 90P, thus moving  
25 the applicator roller 66 to the off-impression position. As the  
26 power arms retract, the inking/coater apparatus 60 is rotated  
27 counterclockwise on the pivot pins 88P, 90P, thus moving the  
28 applicator roller 66 to the on-impression position. The torque  
29 applied by the pneumatic actuators is transmitted to the ink-  
30 ing/coating apparatus 10 through the pivot pin 112 and pivot pin  
31 114.

32 Fine adjustment of the on-impression position of the  
33 applicator roller relative to the plate cylinder or the blanket  
34 cylinder, and of the pressure of roller engagement, is provided by  
35 an adjustable stop assembly 115. The adjustable stop assembly 115

1 has a threaded bolt 116 which is engagable with a bell crank 118.  
2 The bell crank 118 is pivotally coupled to the side support member  
3 74 on a pin 120. One end of the bell crank 118 is engagable by  
4 the threaded bolt 116, and a cam roller 122 is mounted for  
5 rotation on its opposite end. The striking point of engagement is  
6 adjusted by rotation of the bolt 116 so that the applicator roller  
7 66 is properly positioned for inking/coating engagement with the  
8 plate P or blanket B and provides the desired amount of ink-  
9 ing/coating pressure when the inking/coating assembly 60 is moved  
10 to the operative position.

11 This arrangement permits the in-line inking/coating  
12 apparatus to operate effectively without encroaching in the  
13 interunit space between any adjacent printing units, and without  
14 blocking or obstructing access to the cylinders of the printing  
15 units when the inking/coating apparatus is in the extended (off-  
16 impression) position or retracted (on-impression) position.  
17 Moreover, when the in-line inking/coating apparatus is in the  
18 retracted position, the doctor blade reservoir and coating  
19 circulation lines can be drained and flushed automatically while  
20 the printing press is running as well as when the press has been  
21 stopped for change-over from one job to another or from one type  
22 of ink or coating to another.

23 Substrates which are printed or coated with aqueous  
24 flexographic printing inks require high velocity hot air for  
25 drying. When printing a flexographic ink such as opaque white or  
26 metallic gold, it is always necessary to dry the printed sub-  
27 strates between printing units before overprinting them.  
28 According to the present invention, the water component on the  
29 surface of the freshly printed or coated substrate S is evaporated  
30 and dried by high velocity, hot air interunit dryer and high  
31 volume heat and moisture extractor units 124, 126 and 128, as  
32 shown in FIGURE 2, FIGURE 4 and FIGURE 5. The dryer/extractor  
33 units 124, 126 and 128 are oriented to direct high velocity heated  
34 air onto the freshly printed/coated substrates as they are  
35 transferred by the impression cylinder 36 and the intermediate



1 transfer drum 40 of one printing unit and to another transfer  
2 cylinder 30 and to the impression cylinder 36 of the next printing  
3 unit. By that arrangement, the freshly printed flexographic ink  
4 or coating material is dried before the substrate S is overprinted  
5 by the next printing unit.

6 The high velocity, hot air dryer and high performance  
7 heat and moisture extractor units 124, 126 and 128 utilize high  
8 velocity air jets which scrub and break-up the moist air layer  
9 which clings to the surface of each freshly printed or coated  
10 sheet or web. Within each dryer, high velocity air is heated as  
11 it flows across a resistance heating element within an air  
12 delivery baffle tube. High velocity jets of hot air are dis-  
13 charged through multiple airflow apertures into an exposure zone  
14 Z (FIGURE 4 and FIGURE 5) and onto the freshly printed/coated  
15 sheet S as it is transferred by the impression cylinder 36 and  
16 transfer drum 40, respectively.

17 Each dryer assembly includes a pair of air delivery  
18 dryer heads 124D, 126D and 128D which are arranged in spaced,  
19 side-by-side relationship. The high velocity, hot air dryer and  
20 high performance heat and moisture extractor units 124, 126 and  
21 128 are preferably constructed as disclosed in co-pending U.S.  
22 Patent Application Serial No. 08/132,584, filed October 6, 1993,  
23 entitled "High Velocity Hot Air Dryer", to Howard W. DeMoore, co-  
24 inventor and assignee of the present invention, and which is  
25 incorporated herein by reference, and which is marketed by  
26 Printing Research, Inc. of Dallas, Texas, U.S.A., under its  
27 trademark SUPER BLUE HV™.

28 The hot moisture-laden air displaced from the surface of  
29 each printed or coated sheet is extracted from the dryer exposure  
30 zone Z and exhausted from the printing unit by the high volume  
31 extractors 124, 126 and 128. Each extractor head includes an  
32 extractor manifold 124E, 126E and 128E coupled to the dryer heads  
33 124D, 126D and 128D and draws the moisture, volatiles, odors and  
34 hot air through a longitudinal air gap G between the dryer heads.  
35 Best results are obtained when extraction is performed simulta-

1 neously with drying. Preferably, an extractor is closely coupled  
2 to the exposure zone Z at each dryer location as shown in FIGURE  
3 4. Extractor heads 124E, 126E and 128E are mounted on the dryer  
4 heads 124D, 126D and 128D, respectively, with the longitudinal  
5 extractor air gap G facing directly into the exposure zone Z.  
6 According to this arrangement, each printed or coated sheet is  
7 dried before it is printed on the next printing unit.

8 The aqueous water-based inks used in flexographic  
9 printing evaporate at a relatively moderate temperature provided  
10 by the interunit high velocity hot air dryers/extractors 124, 126  
11 and 128. Sharpness and print quality are substantially improved  
12 since the flexographic ink or coating material is dried before it  
13 is overprinted on the next printing unit. Since the freshly  
14 printed flexographic ink is dry, dot gain is substantially reduced  
15 and back-trapping on the blanket of the next printing unit is  
16 virtually eliminated. This interunit drying/extracting arrange-  
17 ment makes it possible to print flexographic inks such as metallic  
18 ink and opaque white ink on the first printing unit, and then dry-  
19 trap and overprint on the second and subsequent printing units.

20 Moreover, this arrangement permits the first printing  
21 unit 22 to be used as a coater in which a flexographic, aqueous or  
22 UV-curable coating material is applied to the lowest grade  
23 substrate such as recycled paper, cardboard, plastic and the like,  
24 to trap and seal-in lint, dust, spray powder and other debris and  
25 provide a smoother, more durable printing surface which can be  
26 overprinted on the next printing unit.

27 A first down (primer) aqueous coating layer seals-in the  
28 surface of a low grade, rough substrate, for example, re-cycled  
29 paper or plastic, and improves overprinted dot definition and  
30 provides better ink lay-down while preventing strike-through and  
31 show-through. A flexographic UV-curable coating material can then  
32 be applied downstream over the primer coating, thus producing  
33 higher coating gloss.

34 Preferably, the applicator roller 66 is constructed of  
35 composite carbon fiber material, metal or ceramic coated metal

1 when it is used for applying ink or coating material to the  
2 blanket B or other resilient material on the blanket cylinder 34.  
3 When the applicator roller 66 is applied to the plate, it is  
4 preferably constructed as an anilox roller having a resilient,  
5 compressible transfer surface. Suitable resilient roller surface  
6 materials include Buna N synthetic rubber and EPDM (terpolymer  
7 elastomer).

8 It has been demonstrated in prototype testing that the  
9 inking/coating apparatus 10 can apply a wide range of ink and  
10 coating types, including fluorescent (Day Glo), pearlescent,  
11 metallics (gold, silver and other metals), glitter, scratch and  
12 sniff (micro-encapsulated fragrance), scratch and reveal,  
13 luminous, pressure-sensitive adhesives and the like, as well as  
14 UV-curable and aqueous coatings.

15 With the dampener assembly removed from the printing  
16 unit, the inking/coating apparatus 10 can easily be installed in  
17 the dampener space for selectively applying flexographic inks  
18 and/or coatings to a flexographic or waterless printing plate or  
19 to the blanket. Moreover, overprinting of the flexographic inks  
20 and coatings can be performed on the next printing unit since the  
21 flexographic inks and/or coatings are dried by the high velocity,  
22 hot air interunit dryer and high volume heat and moisture  
23 extractor assembly of the present invention.

24 The flexographic inks and coatings as used in the  
25 present invention contain colored pigments and/or soluble dyes,  
26 binders which fix the pigments onto the surface of the substrate,  
27 waxes, defoamers, thickeners and solvents. Aqueous printing inks  
28 predominantly contain water as a diluent and/or vehicle. The  
29 thickeners which are preferred include algonates, starch,  
30 cellulose and its derivatives, for example cellulose esters or  
31 cellulose ethers and the like. Coloring agents including organic  
32 as well as inorganic pigments may be derived from dyes which are  
33 insoluble in water and solvents. Suitable binders include  
34 acrylates and/or polyvinylchloride.

1           When metallic inks are printed, the cells of the anilox  
2   roller must be appropriately sized to prevent the metal particles  
3   from getting stuck within the cells. For example, for metallic  
4   gold ink, the anilox roller should have a screen line count in the  
5   range of 175-300 lines per inch (68-118 lines per cm). Prefera-  
6   bly, in order to keep the anilox roller cells clear, the doctor  
7   blade assembly 68 is equipped with a bristle brush BR (FIGURE 14)  
8   as set forth in U.S. Patent 5,425,809 to Steven M. Person,  
9   assigned to Howard W. DeMoore, and licensed to Printing Research,  
10   Inc. of Dallas, Texas, U.S.A., which is incorporated herein by  
11   reference.

12           The inking/coating apparatus 10 can also apply UV-  
13   curable inks and coatings. If UV-curable inks and coatings are  
14   utilized, ultra-violet dryers/extractors are installed adjacent to  
15   the high velocity hot air dryer/extractor units 124, 126 and 128,  
16   respectively.

17           It will be appreciated that the LITHOFLEX™ printing  
18   process described herein makes it possible to selectively operate  
19   a printing unit of a press in the lithographic printing mode while  
20   simultaneously operating another printing unit of the same press  
21   in either the flexographic printing mode or in the waterless  
22   printing mode, while also providing the capability to print or  
23   coat, separately or simultaneously, from either the plate position  
24   or the blanket position. The dual cradle support arrangement of  
25   the present invention makes it possible to quickly change over  
26   from inking/coating on the blanket cylinder position to ink-  
27   ing/coating on the plate cylinder position with minimum press  
28   down-time, since it is only necessary to remove and reposition or  
29   replace the applicator roller 66 while the inking/coating  
30   apparatus 10 is in the retracted position. It is only necessary  
31   to remove four cap screws, lift the applicator roller 66 from the  
32   cradle, and reposition it in the other cradle. All of this can be  
33   accomplished in a few minutes, without removing the inking/coating  
34   apparatus 10 from the press.

1 It is possible to spot coat or overall coat from the  
2 plate position or from the blanket position with flexographic inks  
3 or coatings on one printing unit and then spot coat or overall  
4 coat with UV-curable inks or coatings from the plate position or  
5 from the blanket position on another printing unit during the same  
6 press run. Moreover, the press operator can spot or overall coat  
7 from the plate for one job, and then spot and/or overall coat from  
8 the blanket on the next job.

9 The positioning of the applicator roller relative to the  
10 plate or blanket is repeatable to a predetermined preset operative  
11 position. Consequently, only minor printing unit modifications or  
12 alterations may be required for the LITHOFLEX™ process. Although  
13 automatic extension and retraction have been described in  
14 connection with the exemplary embodiment, extension to the  
15 operative (on-impression) position and retraction to a non-  
16 operative (off-impression) position can be carried out manually,  
17 if desired. In the manual embodiment, it is necessary to latch  
18 the inking/coating apparatus 10 to the press side frames 14, 15 in  
19 the operative (on-impression) position, and to mechanically prop  
20 the inking/coating apparatus in the off-impression (retracted)  
21 position.

22 Referring again to FIGURE 8, an applicator roller 66 is  
23 mounted on the lower cradle assembly 100 by side support members  
24 78, 80, and a second applicator roller 66 is mounted on the upper  
25 cradle assembly 102 by side support members 82, 84. According to  
26 this arrangement, the inking/coating apparatus 10 can apply  
27 printing ink and/or coating material to a plate on the plate  
28 cylinder, while simultaneously applying printing ink and/or  
29 coating material to a plate or a blanket on the blanket cylinder  
30 of the same printing unit. When the same color ink is used by the  
31 upper and lower applicator rollers from the plate position and  
32 from the blanket position simultaneously on the same printing  
33 unit, a "double bump" or double inking films or coating layers are  
34 applied to the substrate S during a single pass of the substrate  
35 through the printing unit. The tack of the two inks or coating

1 materials must be compatible for good transfer during the double  
2 bump. Moreover, the inking/coating apparatus 10 can be used for  
3 supplying ink or coating material to the blanket cylinder of a  
4 rotary offset web press, or to the blanket of a dedicated coating  
5 unit.

6 According to conventional bronzing techniques, a  
7 metallic (bronze) powder is applied off-line to previously printed  
8 substrate which produces a grainy, textured finish or appearance.  
9 The on-line application of bronze material by conventional flexo-  
10 graphic or lithographic printing will only produce a smooth,  
11 continuous appearance. However, a grainy, textured finish is  
12 preferred for highest quality printing which, prior to the present  
13 invention, could only be produced by off-line methods.

14 Referring now to FIGURE 14 and FIGURE 15, metallic ink  
15 or coating material is applied on-line to the substrate S by  
16 simultaneous operation of the upper and lower applicator rollers  
17 67R, 66 to produce an uneven surface finish having a bronze-like  
18 textured or grainy appearance. According to the simulated  
19 bronzing method of the present invention, the flexographic bronze  
20 ink is applied simultaneously to the plate and to the blanket by  
21 the dual cradle inking/coating apparatus 10 as shown in FIGURE 14.  
22 A resilient applicator roller 67R is mounted in the upper cradle  
23 102, and an anilox applicator roller 66 is mounted on the lower  
24 cradle 100. The rollers are supplied from separate doctor blade  
25 reservoirs 70. The doctor blade reservoir 70 in the upper cradle  
26 position supplies bronze ink or coating material having relatively  
27 coarse, metallic particles 140 dispersed in aqueous or flexo-  
28 graphic ink. The coarse particle ink or coating material is  
29 applied to the plate P by the resilient applicator roller 67R in  
30 the upper cradle position 102. At the same time, flexographic  
31 and/or bronze ink or coating material having relatively fine,  
32 metallic particles 142 is transferred to the blanket B by the  
33 anilox roller 66 which is mounted on the lower cradle 100.

34 The metering surfaces of the upper and lower applicator  
35 rollers have different cell sizes and volumetric capacities which

1 accommodate the coarse and fine metallic particles. For example,  
2 the anilox roller 111 mounted in the upper cradle position 102  
3 which transfers the coarse metallic particles 140 preferably has  
4 a screen line count in the range of 100-300 lines per inch (39-118  
5 lines per cm), and the metering surface of the anilox roller 66  
6 mounted on the lower cradle 100 which transfers the relatively  
7 fine metallic particles 142 preferably has a screen line count in  
8 the range of 200-600 lines per inch (79-236 lines per cm).

9 After transfer from the plate to the blanket, the fine  
10 metallic particles 142 form a layer over the coarse metallic  
11 particles 140. As both bronze layers are offset onto the  
12 substrate S, the layer of fine metallic particles 142 is printed  
13 onto the substrate S with the top layer of coarse metallic  
14 particles 140 providing a textured, grainy appearance. The fine  
15 metallic particles 142 cover the substrate which would otherwise  
16 be visible in the gaps between the coarse metallic particles 140.  
17 The combination of the coarse particle layer over the fine  
18 particle layer thus provides a textured, bronzed-like finish and  
19 appearance.

20 Particulate materials other than metal can be used for  
21 producing a textured finish. For example, coarse and fine  
22 particles of metallized plastic (glitter), mica particles  
23 (pearlescent) and the like, can be substituted for the metallic  
24 particles for producing unlimited surface variations, appearances  
25 and effects. All of the particulate material, including the  
26 metallic particles, are preferably in solid, flat platelet form,  
27 and have a size dimension suitable for application by an anilox  
28 applicator roller. Other particulate or granular material, for  
29 example stone grit having irregular form and size, can be used to  
30 good advantage.

31 Solid metal particles in platelet form, which are good  
32 reflectors of light, are preferred for producing the bronzed-like  
33 appearance and effect. However, various textured finishes, which  
34 could have light-reflective properties, can be produced by using  
35 granular materials such as stone grit. Most commonly used metals

1 include copper, zinc and aluminum. Other ductile metals can be  
2 used, if desired. Moreover, the coarse and fine particles need  
3 not be made of the same particulate material. Various effects and  
4 textured appearances can be produced by utilizing diverse  
5 particulate materials for the coarse particles and the fine  
6 particles, respectively. Further, either fine or coarse particle  
7 ink or coating material can be printed from the upper cradle  
8 position, and either fine or coarse particle ink or coating  
9 material can be printed from the lower cradle position, depending  
10 on the special or surface finish that is desired.

11 It will be appreciated that the last printing unit 28  
12 can be configured for additional inking/coating capabilities which  
13 include lithographic, waterless, aqueous and flexographic  
14 processes. Various substrate surface effects (for example double  
15 bump or triple bump inking/coating or bronzing) can be performed  
16 on the last printing unit. For triple bump inking/coating, the  
17 last printing unit 28 is equipped with an auxiliary in-line inking  
18 or coating apparatus 97 as shown in FIGURE 3 and FIGURE 4. The  
19 in-line inking or coating apparatus 97 allows the application of  
20 yet another film of ink or a protective or decorative layer of  
21 coating material over any freshly printed or coated surface  
22 effects or special treatments, thereby producing a triple bump.  
23 The triple bump is achieved by applying a third film of ink or  
24 layer of coating material over the freshly printed or coated  
25 double bump simultaneously while the substrate is on the impres-  
26 sion cylinder of the last printing unit.

27 When the in-line inking/coating apparatus 97 is  
28 installed, it is necessary to remove the SUPER BLUE® flexible  
29 covering from the delivery cylinder 42, and it is also necessary  
30 to modify or convert the delivery cylinder 42 for inking/coating  
31 service by mounting a plate or blanket B on the delivery cylinder  
32 42, as shown in FIGURE 3 and FIGURE 4. Packing material is placed  
33 under the plate or blanket B, thereby packing the plate or blanket  
34 B at the correct packed-to-print radial clearance so that ink or  
35 coating material will be printed or coated onto the freshly



1 printed substrate S as it transfers through the nip between the  
2 plate or blanket B on the converted delivery cylinder 42 and the  
3 last impression cylinder 36. According to this arrangement, a  
4 freshly printed or coated substrate is overprinted or overcoated  
5 with a third film or layer of ink or coating material simulta-  
6 neously while a second film or layer of ink or coating material is  
7 being over-printed or over-coated on the last impression cylinder  
8 36.

9 The auxiliary inking/coating apparatus 97 and the  
10 converted or modified delivery cylinder 42 are mounted on the  
11 delivery drive shaft 43. The inking/coating apparatus 97 includes  
12 an applicator roller, preferably an anilox applicator roller 97A,  
13 for supplying ink or coating material to a plate or blanket B on  
14 the modified or converted delivery cylinder 42. The in-line  
15 inking/coating apparatus 97 and the modified or converted delivery  
16 cylinder 42 are preferably constructed as described in U.S. Patent  
17 5,176,077 to Howard W. DeMoore (co-inventor and assignee), which  
18 is hereby incorporated by reference. The in-line inking/coating  
19 apparatus 97 is manufactured and sold by Printing Research, Inc.  
20 of Dallas, Texas, U.S.A., under its trademark SUPER BLUE EZ  
21 COATER™.

22 After the delivery cylinder 42 has been modified or  
23 converted for inking/coating service, and because of the reduced  
24 nip clearance imposed by the plate or blanket B, the modified  
25 delivery cylinder 42 can no longer perform its original function  
26 of guiding and transferring the freshly printed or coated  
27 substrate. Instead, the modified or converted delivery cylinder  
28 42 functions as a part of the inking/coating apparatus 97 by  
29 printing or coating a third down film of ink or layer of coating  
30 material onto the freshly printed or coated substrate as it is  
31 simultaneously printed or coated on the last impression cylinder  
32 36. Moreover, the mutual tack between the second down ink film or  
33 coating layer and the third down ink film or coating layer causes  
34 the overprinted or overcoated substrate to cling to the plate or

1 blanket, thus opposing or resisting separation of the substrate  
2 from the plate or blanket.

3 To remedy this problem, a vacuum-assisted transfer  
4 apparatus 99 is mounted adjacent the modified or converted  
5 delivery cylinder 42 as shown in FIGURE 3 and FIGURE 4. Another  
6 purpose of the vacuum-assisted transfer apparatus 99 is to  
7 separate the freshly overprinted or overcoated triple bump  
8 substrate from the plate or blanket B as the substrate transfers  
9 through the nip. The vacuum-assisted transfer apparatus 99  
10 produces a pressure differential across the freshly overprinted or  
11 overcoated substrate as it transfers through the nip, thus  
12 producing a separation force onto the substrate and providing a  
13 clean separation from the plate or blanket B.

14 The vacuum-assisted transfer apparatus 99 is preferably  
15 constructed as described in U.S. Patent Nos. 5,113,255; 5,127,329;  
16 5,205,217; 5,228,391; 5,243,909; and 5,419,254, all to Howard W.  
17 DeMoore, co-inventor, which are incorporated herein by reference.  
18 The vacuum-assisted transfer apparatus 99 is manufactured and sold  
19 by Printing Research, Inc. of Dallas, Texas, U.S.A. under its  
20 trademark BACVAC™.

21 Although the present invention and its advantages have  
22 been described in detail, it should be understood that various  
23 changes, substitutions and alterations can be made herein without  
24 departing from the spirit and scope of the present invention as  
defined by the appended claims.

What is claimed is:

1           1. In a printing press of the type having first and  
2 second side frame members forming a printing unit on which a plate  
3 cylinder, a blanket cylinder and an impression cylinder are  
4 supported for rotation, the improvement comprising:

5                 inking/coating apparatus movably coupled to the  
6 printing unit for movement to an on-impression operative position  
7 and to an off-impression retracted position; and,

8                 the inking/coating apparatus including means for  
9 applying ink or coating material to a plate mounted on the plate  
10 cylinder, or to a plate or blanket mounted on the blanket  
11 cylinder, either separately or simultaneously when the ink-  
12 ing/coating apparatus is in the operative position.

13           2. The invention as set forth in claim 1, wherein the  
14 inking/coating apparatus comprises:

15                 a doctor blade assembly having a reservoir for  
16 receiving ink or coating material;

17                 an applicator roller coupled to the doctor blade  
18 assembly in fluid communication with the reservoir, the applicator  
19 roller being engagable with a printing plate on the plate cylinder  
20 or with a blanket on the blanket cylinder when the inking/coating  
apparatus is in the operative position.

1           3. The invention as set forth in claim 2, the  
2 applicator roller comprising:

3                 an anilox roller having a resilient transfer  
surface.

1           4. The invention as set forth in claim 1, including:

2                 first and second pivot pins mounted on the first  
3 and second side frame members, respectively, said pivot pins  
4 extending in alignment with the plate and blanket cylinders; and

5 the inking/coating apparatus being pivotally  
6 coupled for rotational movement on the pivot pins.

7 5. The invention as set forth in claim 1, further  
8 comprising:

9 a power actuator pivotally coupled to the printing  
10 unit, the power actuator having a power transfer arm which is  
11 extendable and retractable; and,

12 apparatus coupled to the power transfer arm and to  
13 the inking/coating apparatus for converting extension or retrac-  
14 tion movement of the power transfer arm into pivotal movement of  
15 the inking/coating apparatus relative to the plate and blanket  
cylinders,

1 6. The invention as set forth in claim 5, in which the  
2 movement converting apparatus comprises:

3 a bell crank plate having a first end portion  
4 pivotally coupled to the inking/coating apparatus for engaging the  
5 printing unit and having a second end portion for engaging a stop  
6 member; and,

7 a stop member coupled to the inking/coating  
8 apparatus for engaging the second end portion of the bell crank  
9 plate.

10 7. The invention as set forth in claim 1, the  
11 inking/coating apparatus comprising:

12 an applicator head having first and second side  
13 support members;

14 the ink or coating applying means being mounted  
15 between the first side support member and second side support  
16 member and having a reservoir or fountain pan for receiving ink or  
17 coating material;

18 cradle means mounted on the first and second side  
19 support members, respectively;

20 applicator roller means including at least one  
21 applicator roller mounted for rotation on the cradle means and  
22 disposed for rolling contact with ink or coating material in the  
23 reservoir or fountain pan, the applicator roller being engagable  
24 with a printing plate on the plate cylinder or with a blanket on  
25 the blanket cylinder in the operative position; and,  
26 power transfer means coupled to the applicator  
roller means for rotating the at least one applicator roller.

1 8. The invention as set forth in claim 7,  
2 the at least one cradle means including first and  
3 second cradles disposed on the first and second side support  
4 members respectively; and,  
5 the applicator roller being mounted for rotation on  
one of the first and second cradles.

1 9. The invention as set forth in claim 7,  
2 the cradle means including a first cradle assembly  
3 disposed on the first and second side support members, respective-  
4 ly, and a second cradle assembly disposed on the first and second  
5 side support members, respectively;  
6 the applicator roller means including a first  
7 applicator roller mounted for rotation on the first cradle  
8 assembly for applying ink or coating material to a plate mounted  
9 on the plate cylinder when the inking/coating apparatus is in the  
10 operative position; and,  
11 the applicator roller means including a second  
12 applicator roller mounted for rotation on the second cradle  
13 assembly for applying ink or coating material to a plate or a  
14 blanket mounted on the blanket cylinder when the inking/coating  
apparatus is in the operative position.

1 10. The invention as set forth in claim 1, wherein the  
2 printing unit having a dampener space, and the inking/coating  
3 apparatus being disposed within the dampener space.

4 11. A printing press comprising, in combination:  
5 a printing unit;  
6 at least one cylinder mounted for rotation in the  
7 printing unit for printing ink or coating material onto a  
8 substrate transferring through said printing unit;  
9 inking/coating apparatus having container means for  
10 containing liquid ink or coating material, a rotatable applicator  
11 roller and means for applying liquid ink or coating material from  
12 the container means to a peripheral surface portion of the  
13 applicator roller; and,  
14 support means mounted on the printing unit, said  
15 inking/coating apparatus being movably coupled to the support  
16 means for movement to an operative on-impression position in which  
17 the applicator roller is engagable with a plate or a blanket  
18 mounted on said at least one cylinder, and for movement to an off-  
19 impression position in which the inking/coating apparatus is  
retracted away from said at least one cylinder.

1 12. A printing press as defined in claim 11, wherein  
2 the container means comprises a doctor blade assembly having a  
3 reservoir or fountain pan for supplying ink or coating material to  
4 the applicator roller, and having a doctor blade disposed for  
5 wiping engagement with the applicator roller when it is received  
6 in rolling contact with ink or coating material in the reservoir  
or pan.

1 13. A printing press as defined in claim 11, wherein  
2 the container means comprises a fountain pan and the inking  
3 applying means comprises a pan roller for transferring ink or  
coating material from the fountain pan to the applicator roller.

1 14. A printing unit of the type having a delivery side  
2 and a dampener side comprising, in combination:

3 a plate cylinder mounted on the printing unit  
4 between the delivery side and the dampener side, and a printing  
5 plate mounted on the plate cylinder;

6 a blanket cylinder having an ink or coating  
7 receptive blanket disposed in ink or coating transfer engagement  
8 with the plate for transferring ink or coating material from the  
9 image surface areas of the printing plate to the ink or coating  
10 receptive blanket;

11 an impression cylinder disposed adjacent the  
12 blanket cylinder thereby forming a nip between the blanket and the  
13 impression cylinder whereby the printing ink or coating material  
14 is transferred from the blanket to a substrate as the substrate is  
15 transferred through the nip;

16 support means mounted on the dampener side of the  
17 printing unit; and,

18 inking/coating apparatus for applying ink or  
19 coating material to the plate or to the blanket, the inking/  
20 coating apparatus being movably coupled to the support means for  
21 movement to an operative, on-impression position in which the  
22 inking/coating apparatus is engagable with the plate or the  
23 blanket, and for movement to an off-impression position in which  
24 the inking/coating apparatus is retracted and disengaged from the  
plate and blanket.

1 15. The invention as defined in claim 14, including:

2 a dryer mounted on the printing unit for discharg-  
3 ing heated air onto a freshly printed or coated substrate before  
4 the freshly printed or coated substrate is subsequently printed,  
coated or otherwise processed.

1 16. The invention as defined in claim 14, wherein:

2 the dryer is mounted adjacent to the impression  
3 cylinder for discharging heated air onto a freshly printed or  
4 coated substrate while the substrate is in contact with the  
impression cylinder.

1           17. The invention as defined in claim 14, comprising:  
2           an extractor coupled to the dryer for extracting  
3 hot air, moisture, odors and volatiles from an exposure zone  
between the dryer and the freshly printed or coated substrate.

1           18. The invention as defined in claim 14, comprising:  
2           a transfer cylinder disposed in an interunit  
3 position on the press and coupled in sheet transfer relation with  
4 the impression cylinder; and,  
5           an interunit dryer disposed adjacent the transfer  
6 cylinder for discharging heated air onto a freshly printed or  
7 coated substrate after it has been transferred from the impression  
cylinder and while it is in contact with the transfer cylinder.

1           19. In a printing press of the type having first and  
2 second side frame members providing support for a printing unit in  
3 which a blanket cylinder is disposed between the delivery side and  
4 the dampener side of the printing unit, the improvement compris-  
5 ing:

6           support means mounted on the side frame members on  
7 the dampener side of the printing unit;

8           inking/coating apparatus for applying ink or  
9 coating material to a blanket mounted on the blanket cylinder when  
10 the inking/coating apparatus is in the operative on-impression  
11 position; and,

12           the inking/coating apparatus being pivotally  
13 coupled to the support means for movement to the operative  
14 position in which the inking/coating apparatus is supported  
15 laterally adjacent to the blanket cylinder, and to an off-  
16 impression position in which the inking/coating apparatus is  
retracted away from the blanket cylinder.

1           20. The invention as set forth in claim 19, wherein the  
2 printing unit includes a plate cylinder and a plate mounted on the  
3 plate cylinder, the inking/coating apparatus including:



4 first cradle means for supporting an applicator  
5 roller for engagement with the plate when the inking/coating  
6 apparatus is in the operative position; and,  
7 second cradle means for supporting an applicator  
8 roller for engagement with the blanket when the inking/coating  
apparatus is in the operative position.

1 21. The invention as set forth in claim 19, said  
2 support means comprising:

3 first and second pivot means mounted on the first  
and second side frame members, respectively.

1 22. The invention as set forth in claim 19, further  
2 comprising:

3 a power actuator pivotally coupled to the ink-  
4 ing/coating apparatus, the power actuator having a power transfer  
5 arm which is selectively extendable or retractable; and,

6 apparatus coupled to the power transfer arm and to  
7 the inking/coating apparatus for converting extension or retrac-  
8 tion movement of the power transfer arm into pivotal movement of  
the inking/coating apparatus relative to the printing unit.

1 23. The invention as set forth in claim 19, further  
2 comprising:

3 a bell crank plate having a first end portion  
4 coupled to the inking/coating apparatus and having a second end  
5 portion for engaging a stop member; and,

6 a stop member secured to the inking/coating  
7 apparatus for engaging the second end portion of the bell crank  
plate.

1 24. The invention as set forth in claim 1, wherein the  
2 inking/coating apparatus comprises:

3 an applicator roller having a resilient transfer  
surface.

1           25. The invention as set forth in claim 1, wherein the  
2 applicator roller is supported for engagement with a plate on the  
3 plate cylinder in the operative position, the applicator roller  
comprising an anilox roller having a resilient transfer surface.

1           26. A printing press having a lithographic printing  
2 unit comprising, in combination:

3           a plate cylinder having a waterless printing plate  
4 mounted thereon, the waterless printing plate having non-image  
5 surface areas which are oleophobic and hydrophobic, and having  
6 image surface areas which are oleophilic and hydrophilic;

7           a blanket cylinder having an ink or coating  
8 receptive blanket disposed in ink or coating transfer engagement  
9 with the waterless printing plate for receiving printing ink or  
10 coating material from the image surface areas of the waterless  
11 printing plate;

12           an impression cylinder disposed adjacent the  
13 blanket cylinder thereby forming a nip between the blanket and the  
14 impression cylinder wherein printing ink or coating material can  
15 be transferred from the blanket to a substrate as the substrate is  
16 transferred through the nip;

17           inking/coating apparatus movably coupled to the  
18 printing unit for movement to an on-impression operative position  
19 and to an off-impression retracted position; and,

20           the inking/coating apparatus including applicator  
21 means for applying aqueous or flexographic ink or coating material  
22 to the waterless printing plate mounted on the plate cylinder or  
23 to a blanket mounted on the blanket cylinder, either separately or  
24 simultaneously, when the inking/coating apparatus is in the  
operative position.

1           27. A printing press as defined in claim 26 including:  
2           a dryer mounted on the printing unit for discharg-  
3 ing heated air onto a freshly printed or coated substrate before  
4 the freshly printed or coated substrate is subsequently printed,  
coated or otherwise processed.

1           28. A printing press as defined in claim 27, wherein:  
2           the dryer is mounted adjacent the impression  
3 cylinder for discharging heated air onto a freshly printed or  
4 coated substrate while the substrate is in contact with the  
impression cylinder.

1           29. A printing press as defined in claim 26, compris-  
2 ing:  
3           a substrate transfer apparatus disposed in an  
4 interunit position on the press and coupled in sheet transfer  
5 relation with the impression cylinder;  
6           an interunit dryer disposed adjacent the substrate  
7 transfer apparatus for discharging heated air onto a freshly  
8 printed or coated substrate after it has been transferred from the  
9 printing unit and while it is in contact with the transfer  
cylinder.

1           30. A printing press as defined in claim 26, compris-  
2 ing:  
3           a dryer mounted on the printing unit for discharg-  
4 ing heated air onto a freshly printed or coated substrate; and,  
5           an extractor coupled to the dryer for extracting  
6 hot air and moisture vapors from an exposure zone between the  
dryer and the freshly printed or coated substrate.

1           31. A printing press as defined in any one of claims 1,  
2 11, 14, 19 or 26, including:  
3           a supply container for containing a volume of  
4 liquid ink or coating material;

5                   circulation means coupled between the supply  
6 reservoir and the inking/coating apparatus for inducing the flow  
7 of liquid ink or coating material from said supply container to  
8 the inking/coating apparatus and for returning liquid ink or  
9 coating material from the inking/coating apparatus to the supply  
10 container; and,

11                   heat exchanger means coupled to the circulation  
12 means for maintaining the temperature of the liquid ink or coating  
material within a predetermined temperature range.

1                   32. A printing press as set forth in any one of the  
2 claims 1, 11, 14, 19 or 26, wherein the inking/coating apparatus  
3 comprises:

4                   a fountain pan for containing a volume of liquid  
5 ink or coating material;

6                   an applicator roller having a metering surface;  
7 and,

8                   a pan roller mounted for rotation in the fountain  
9 pan and coupled to the applicator roller for transferring ink or  
coating material from the fountain pan to the applicator roller.

1                   33. A printing press as defined in any one of claims 1,  
2 11, 14, 19 or 26, characterized in that:

3                   a resilient packing is mounted on the blanket  
4 cylinder, and a printing plate is mounted on the resilient  
packing.

1                   34. A printing press as defined in claim 14, further  
2 including:

3                   a transfer drum coupled in substrate transfer  
4 relation with the impression cylinder of a first printing unit and  
5 in substrate transfer relation with the impression cylinder of a  
6 second printing unit;

7                   a first dryer mounted adjacent the impression  
8 cylinder of the first printing unit for discharging heated air

9 onto a freshly printed or coated substrate while the substrate is  
10 in contact with the impression cylinder of the first printing  
11 unit;

12 a second dryer mounted adjacent the transfer drum  
13 for discharging heated air onto a freshly printed or coated  
14 substrate after it has been transferred from the impression  
15 cylinder of the first printing unit and while it is in contact  
16 with the transfer cylinder; and,

17 a third dryer disposed adjacent the impression  
18 cylinder of the second printing unit for discharging heated air  
19 onto a freshly printed or coated substrate after it has been  
20 transferred from the transfer drum and while it is in contact with  
the impression cylinder of the second printing unit.

1 35. A printing press as defined in any one of claims 1,  
2 11, 14, 19 or 26, wherein the means for applying ink or coating  
3 material comprises:

4 first cradle means;

5 a first reservoir or fountain means mounted on the  
6 first cradle means for containing ink or coating material;

7 a first applicator roller mounted for rotation on  
8 the first cradle means and disposed for rolling contact with ink  
9 or coating material in the first reservoir or fountain means, the  
10 first applicator roller being engagable with a printing plate on  
11 the plate cylinder;

12 second cradle means;

13 a second reservoir or fountain means mounted on the  
14 second cradle means for receiving ink or coating material;

15 a second applicator roller mounted for rotation on  
16 the second cradle means and disposed for rolling contact with ink  
17 or coating material in the second reservoir or fountain means, the  
18 second applicator roller being engagable with a plate or blanket  
mounted on the blanket cylinder in the operative position.

36. A printing press as defined in any one of claims 11, 14, 19 or 26, wherein the inking/coating apparatus is pivotally mounted on the printing unit in a position in which the nip contact point between the applicator roller and a blanket or plate is offset with respect to a radius line projecting through the center of the plate cylinder or blanket cylinder to the axis of rotation of the printing/coating unit.

37. A printing press as defined in any one of claims 11, 14, 19 or 26, characterized in that:

the applicator roller having first and second metering transfer surfaces and a seal band surface disposed between and separating the first and second metering transfer surfaces;

the reservoir means having a chamber and a partition seal disposed within the chamber, the partition seal dividing the chamber thereby defining a first reservoir chamber region and a second reservoir chamber region; and,

the partition seal band element being disposed in sealing engagement against the seal band of the applicator roller.

38. A printing press as defined in any one of claims 11, 14, 19 or 26, wherein the inking/coating apparatus comprises:

first cradle means for supporting a first applicator roller for engagement with a plate or blanket when the inking/coating apparatus is in the operative position;

second cradle means for supporting a second applicator roller for engagement with a plate or blanket when the inking/coating apparatus is in the operative position;

a first applicator roller mounted for rotation on the first cradle means, the first applicator roller having first and second fluid metering transfer surfaces and a seal band separating the first and second fluid metering transfer surfaces;

a second applicator roller mounted for rotation on the second cradle means, the second applicator roller having first

15 and second fluid metering transfer surfaces and a seal band  
16 separating the first and second metering transfer surfaces;

17 first reservoir means for containing a volume of  
18 ink or coating material, the first reservoir means having first  
19 and second reservoir chambers and a partition seal element  
20 separating the first and second reservoir chambers;

21 second reservoir means for containing a volume of  
22 ink or coating material, the second reservoir means having first  
23 and second reservoir chambers and a partition seal element  
24 separating the first and second reservoir chambers of the second  
25 reservoir means;

26 the first and second reservoir means being coupled  
27 to the first and second applicator rollers, respectively, the  
28 first and second fluid metering transfer surfaces of the first  
29 applicator roller being disposed for rolling contact with ink or  
30 coating material in the first and second reservoir chambers,  
31 respectively, of the first reservoir means and the first partition  
32 seal element being disposed in sealing engagement against the seal  
33 band of the first applicator roller in the coupled position; and,

34 the first and second fluid metering transfer  
35 surfaces of the second applicator roller being disposed for  
36 rolling contact with ink or coating material in the first and  
37 second reservoir chambers, respectively, of the second reservoir  
38 means and the partition seal element of the second reservoir means  
39 being disposed in sealing engagement with the partition seal band  
of the second applicator roller in the coupled position.

1 39. A printing press as defined in any one of claims  
2 11, 14, 19 or 26, wherein the inking/coating apparatus comprises:

3 first cradle means for supporting a first applica-  
4 tor roller for engagement with a plate or blanket when the  
5 inking/coating apparatus is in the operative position;

6 second cradle means for supporting a second  
7 applicator roller for engagement with a plate or blanket when the  
8 inking/coating apparatus is in the operative position;

9 first reservoir means mounted on the first cradle  
10 means, said first reservoir means having a reservoir chamber for  
11 containing a volume of ink or coating material;

12 second reservoir means mounted on the second cradle  
13 means, said second reservoir means having a reservoir chamber for  
14 containing a volume of ink or coating material;

15 a first applicator roller mounted for rotation on  
16 the first cradle means, the first applicator roller having a fluid  
17 metering transfer surface;

18 a second applicator roller mounted for rotation on  
19 the second cradle means, the second applicator roller having a  
20 fluid metering transfer surface;

21 the first and second applicator rollers being  
22 coupled to the first and second reservoir means, respectively, the  
23 fluid metering transfer surfaces of the first and second applica-  
24 tor rollers being disposed for rolling contact with ink or coating  
25 material in the reservoir chambers of the first and second  
26 reservoir means, respectively; and,

27 the volumetric capacity of the fluid metering  
28 surface of the first applicator roller being different from the  
29 volumetric capacity of the fluid metering surface of the second  
applicator roller.

1 40. A printing press as defined in any one of claims 1,  
2 11, 14, 19 or 26, wherein the means for applying ink or coating  
3 material comprises:

4 cradle means;

5 an applicator roller mounted for rotation on the  
6 cradle means, the applicator roller having first and second fluid  
7 metering transfer surfaces and a seal band separating the first  
8 and second metering transfer surfaces;

9 reservoir means for containing a volume of ink or  
10 coating material, the reservoir means having first and second  
11 reservoir chambers and a partition seal element separating the  
12 first and second reservoir chambers;



13 the applicator roller being coupled to the  
14 reservoir means with the first and second fluid metering transfer  
15 surfaces being disposed for rolling contact with the ink or  
16 coating material in the first and second reservoir chambers,  
17 respectively, and the partition seal element being disposed in  
18 sealing engagement against the seal band of the applicator roller  
19 in the coupled position; and,

20 the volumetric capacity of the first fluid metering  
21 transfer surface being different from the volumetric capacity of  
the second fluid metering transfer surface.

1 41. A method for rotary offset printing in a rotary  
2 offset press of the type including first and second printing  
3 units, the first printing unit having a flexographic printing  
4 plate, a blanket, an impression cylinder and applicator means for  
5 applying aqueous or flexographic printing ink or coating material  
6 to the flexographic printing plate and/or to the blanket,  
7 comprising the following steps performed in succession in the  
8 first printing unit:

9 applying a first spot or overall coating of aqueous  
10 or flexographic printing ink or coating material to the flexo-  
11 graphic printing plate;

12 transferring the aqueous or flexographic printing  
13 ink or coating material from the flexographic printing plate to  
14 the blanket;

15 applying a second spot or overall film of aqueous  
16 or flexographic printing ink or layer of coating material to the  
17 blanket;

18 transferring ink or coating material from the  
19 blanket to a substrate as the substrate is transferred through the  
20 nip between the blanket and the impression cylinder; and,

21 drying the aqueous or flexographic ink or coating  
22 material on the freshly printed or coated substrate before the  
23 substrate is printed, coated or otherwise processed on the second  
printing unit.

1           42. A rotary offset printing press of the type  
2 including first and second printing units, the first printing unit  
3 comprising:

4           a plate cylinder having a flexographic printing  
5 plate mounted thereon;

6           a blanket cylinder having a blanket disposed in ink  
7 or coating transfer engagement with the flexographic printing  
8 plate for receiving aqueous or flexographic printing ink or  
9 coating material from the flexographic printing plate;

10          an impression cylinder disposed adjacent the  
11 blanket cylinder thereby forming a nip between the blanket and the  
12 impression cylinder whereby the aqueous or flexographic printing  
13 ink or coating material can be transferred from the blanket to a  
14 substrate as the substrate is transferred through the nip;

15          inking/coating apparatus movably coupled to the  
16 printing unit for movement to an on-impression operative position  
17 and to an off-impression retracted position;

18          the inking/coating apparatus including container  
19 means for containing a volume of aqueous or flexographic ink or  
20 coating material, and an applicator roller coupled to the  
21 container means for applying the aqueous or flexographic ink or  
22 coating material to the flexographic printing plate or to the  
23 blanket when the inking/coating apparatus is in the on-impression  
24 operative position;

25          the container means having a partition dam dividing  
26 the container means thereby defining a first container region and  
27 a second container region;

28          the applicator roller having first and second  
29 transfer surfaces and means separating the first and second  
30 transfer surfaces; and,

31          the first and second transfer surfaces being  
32 disposed within the first and second container regions for rolling  
33 contact with aqueous or flexographic printing ink or coating  
34 material contained within the first and second container regions,  
respectively.

1           43. A rotary offset printing press as defined in claim  
2   42, wherein:  
3           said separating means is an annular seal element  
4   disposed on the applicator roller; and,  
5           the partition dam is disposed in sealing engagement  
against the annular seal element of the applicator roller.

1           44. A rotary offset printing press as defined in claim  
2   42, wherein:  
3           said container means is an open fountain pan;  
4           said separating means is an annular groove  
5   intersecting the applicator roller thereby separating the first  
6   and second transfer surfaces; and,  
7           the partition dam is a separator plate mounted on  
8   the fountain pan between the first and second reservoir regions  
and disposed in the annular groove.

1           45. A printing press as defined in claim 42, including  
2   sheet feeding means coupled to the first printing unit for  
3   consecutively feeding substrates in sheet form into the first  
printing unit.

1           46. A printing press as defined in claim 42, including  
2   web feeding means coupled to the first printing unit for continu-  
3   ously feeding a substrate in continuous web form into the first  
printing unit.

1           47. A printing press as defined in claim 42, wherein:  
2           said container means is a fountain pan having first  
3   and second pan sections for containing first and second aqueous or  
4   flexographic inks or coating materials, respectively;  
5           said applicator roller having first and second  
6   transfer surfaces and an annular groove separating said first and  
7   second transfer surfaces; and,

8 a pan roller having first and second transfer  
9 surfaces mounted for rotation in the first and second pan  
10 sections, respectively, for separately transferring aqueous or  
11 flexographic ink or coating material from the first and second pan  
12 sections to the first and second transfer surfaces of the  
applicator roller.

1 48. A printing press as set forth in claim 42, wherein:  
2 said container means is a sealed doctor blade head  
3 having first and second reservoir chambers, said partition dam  
4 being mounted on the doctor blade head and separating the first  
5 and second reservoir chambers;

6 the applicator roller comprising a transfer roller  
7 having first and second transfer surfaces disposed for rolling  
8 contact with the aqueous or flexographic ink or coating material  
9 in the first and second reservoir chambers, respectively;

10 the separating means being a seal band formed on  
11 the applicator roller between the first and second transfer  
12 surfaces; and,

13 the partition dam being disposed in sealing  
14 engagement with the seal band of the applicator roller in the  
coupled position.

1 49. A method for rotary offset printing as defined in  
2 claim 41, including the steps:

3 applying a primer coating of an aqueous or  
4 flexographic ink or coating material to a substrate in the first  
5 printing unit;

6 trapping and sealing particulate material such as  
7 dust, lint, anti-offset spray powder and the like under the primer  
8 coating;

9 drying the primer coating on the substrate before  
10 the substrate is printed or coated on the second printing unit;  
11 and,

12                   overprinting the freshly coated substrate in the  
second printing unit.

1                   50. A method for rotary offset printing as defined in  
2 claim 41,

3                   wherein the drying step is performed by directing  
4 heated air onto the freshly printed or coated substrate while the  
5 freshly printed or coated substrate is in contact with the  
impression cylinder of the first printing unit.

1                   51. A method for rotary offset printing as defined in  
2 claim 41, including the steps:

3                   transferring the freshly printed or coated  
4 substrate to an intermediate transfer cylinder disposed between  
5 the first and second printing units; and,

6                   drying the freshly printed or coated substrate  
7 while said substrate is in contact with the intermediate transfer  
cylinder.

1                   52. A method for rotary offset printing as defined in  
2 claim 41, wherein:

3                   the drying step is performed by directing heated  
4 air onto the freshly printed or coated substrate while the freshly  
5 printed or coated substrate is in contact with an impression  
cylinder in the second printing unit.

1                   53. A method for rotary offset printing as defined in  
2 claim 41, wherein the drying step is performed by directing heated  
3 air from a dryer onto the freshly printed or coated substrate, and  
4 including the step:

5                   extracting hot air, moisture and volatiles from an  
6 exposure zone between the freshly printed or coated substrate and  
7 the dryer while the freshly printed or coated substrate is in  
contact with the impression cylinder of the first printing unit.

1           54. A method for rotary offset printing as defined in  
2 claim 41, including the steps:

3           transferring the freshly printed or coated  
4 substrate to an intermediate transfer cylinder disposed between  
5 the first and second printing units;

6           directing heated air from a dryer onto the freshly  
7 printed or coated substrate while said substrate is in contact  
8 with the intermediate transfer cylinder; and,

9           extracting hot air, moisture and volatiles from an  
10 exposure zone between the freshly printed or coated substrate and  
11 said dryer while the freshly printed or coated substrate is in  
contact with the intermediate transfer cylinder.

1           55. A method for rotary offset printing as defined in  
2 claim 41, including the steps:

3           transferring the freshly printed or coated  
4 substrate to an impression cylinder on the second printing unit;

5           directing heated air from a dryer onto the freshly  
6 printed or coated substrate while said substrate is in contact  
7 with the impression cylinder of the second printing unit; and,

8           extracting hot air, moisture and volatiles from an  
9 exposure zone between the freshly printed or coated substrate and  
10 said dryer while said substrate is in contact with the impression  
cylinder of the second printing unit.

1           56. A method for providing an uneven printed or coated  
2 layer on a substrate in a rotary offset printing press of the type  
3 including a printing unit having a plate cylinder, a flexographic  
4 printing plate mounted on the plate cylinder, a blanket cylinder,  
5 a plate or blanket mounted on the blanket cylinder, an impression  
6 cylinder and applicator means for applying aqueous or flexographic  
7 printing ink or coating material to the flexographic printing  
8 plate and/or to the plate or blanket on the blanket cylinder,  
9 comprising the following steps performed in succession in the  
10 printing unit:

11                   applying a first down layer of aqueous or flexo-  
12 graphic ink or coating material containing relatively coarse  
13 particles to the flexographic plate;  
14                   transferring the relatively coarse particle  
15 printing ink or coating material from the flexographic printing  
16 plate to the plate or blanket on the blanket cylinder;  
17                   applying a second down layer of aqueous or  
18 flexographic printing ink or coating material containing relative-  
19 ly fine particles onto the relatively coarse particle printing ink  
20 or coating material;  
21                   transferring the coarse and fine particle ink or  
22 coating material from the blanket or plate on the blanket cylinder  
23 onto a substrate as the substrate is transferred through the nip  
24 between the blanket cylinder and the impression cylinder; and,  
25                   drying the freshly printed or coated substrate  
26 before the freshly printed or coated substrate is subsequently  
printed, coated or otherwise processed.

1                   57. A method for producing a textured finish on the  
2 surface of a substrate as set forth in claim 56, wherein the  
3 coarse and fine particles comprise a metal selected from the group  
including copper, zinc and aluminum.

1                   58. A method for producing a textured finish on the  
2 surface of a substrate as set forth in claim 56, wherein the  
3 coarse and fine particles comprise a non-metallic material  
4 selected from the group consisting of mica, silicon, stone grit  
and plastic.

1                   59. A method for producing a textured finish on the  
2 surface of a substrate as set forth in claim 56, wherein the  
3 coarse and fine particles comprise diverse particulate materials,  
respectively.

1           60. A method for rotary offset printing in a rotary  
2 offset press of the type including first and second printing  
3 units, the first printing unit having a waterless printing plate  
4 mounted on a plate cylinder, a flexographic printing plate or a  
5 blanket mounted on a blanket cylinder, an impression cylinder, an  
6 inking roller train transferring waterless printing ink to the  
7 waterless printing plate, and applicator means for applying  
8 aqueous or flexographic printing ink or coating material to the  
9 flexographic printing plate or blanket on the blanket cylinder,  
10 comprising the following steps performed in succession in the  
11 first printing unit:  
12           applying a film or layer of waterless printing ink  
13 onto the waterless printing plate mounted on the plate cylinder;  
14           transferring the waterless printing ink from the  
15 waterless printing plate to a blanket or flexographic printing  
16 plate mounted on the blanket cylinder;  
17           applying a film or layer of aqueous or flexographic  
18 printing ink or coating material over the waterless printing ink  
19 on a blanket or flexographic printing plate mounted on the blanket  
20 cylinder;  
21           transferring ink or coating material from the plate  
22 or blanket mounted on the blanket cylinder onto a substrate as the  
23 substrate is transferred through the nip between the flexographic  
24 printing plate or blanket and the impression cylinder; and,  
25           drying the ink or coating material on the freshly  
26 printed or coated substrate before the substrate is printed,  
coated or otherwise processed on the second printing unit.

1           61. In a printing press of the type including a rotary  
2 offset printing unit, the improvement comprising:  
3           a plate cylinder mounted on the printing unit, the  
4 plate cylinder having a waterless printing plate mounted thereon;  
5           an inking roller train mounted on the printing unit  
6 and coupled to the waterless printing plate for transferring  
7 waterless printing ink to the waterless printing plate;



8 a blanket cylinder having an ink or coating  
9 material receptive blanket or relief plate disposed in ink or  
10 coating transfer engagement with the waterless printing plate for  
11 receiving waterless printing ink from the waterless printing  
12 plate;

13 applicator means mounted on the printing unit and  
14 coupled to the blanket or the relief plate of the printing unit  
15 for transferring aqueous or flexographic printing ink or coating  
16 material over the waterless printing ink on the blanket or the  
17 relief plate; and,

18 an impression cylinder disposed adjacent the  
19 blanket cylinder thereby forming a nip between the blanket or  
20 relief plate and the impression cylinder whereby printing ink or  
21 coating material can be transferred from the blanket or relief  
22 plate to a substrate as the substrate is transferred through the  
nip.

1 62. A printing press as defined in claim 61, the  
2 printing press including a second printing unit, further includ-  
3 ing:

4 a dryer mounted on the printing unit for discharg-  
5 ing heated air onto a freshly printed or coated substrate before  
6 the freshly printed or coated substrate is printed, coated or  
otherwise processed on the second printing unit.

1 63. A printing press as defined in claim 61, including:

2 a dryer mounted adjacent the impression cylinder of  
3 the first printing unit for discharging heated air onto a freshly  
4 printed or coated substrate while the substrate is in contact with  
the impression cylinder of the printing unit.

1 64. A printing press as defined in claim 61, compris-  
2 ing:

3 a transfer cylinder disposed in an interunit  
4 position on the press and coupled in substrate transfer relation  
5 with the impression cylinder of the printing unit;  
6 a dryer disposed adjacent the transfer cylinder for  
7 discharging heated air onto a freshly printed or coated substrate  
8 after it has been transferred from the printing unit and while it  
is in contact with the transfer cylinder.

1 65. A printing press as defined in claim 61, compris-  
2 ing:

3 a dryer mounted on the printing unit for discharg-  
4 ing heated air onto a freshly printed or coated substrate; and,  
5 an extractor coupled to the dryer for extracting  
6 hot air and moisture vapors from an exposure zone between the  
dryer and the freshly printed or coated substrate.

1 66. A printing press as defined in claim 61, the  
2 printing press including a second printing unit, and the second  
3 printing unit having an impression cylinder, further including:

4 a transfer drum coupled in sheet transfer relation  
5 with the impression cylinder of the first printing unit and in  
6 substrate transfer relation with the impression cylinder of the  
7 second printing unit;

8 a first dryer mounted adjacent the impression  
9 cylinder of the first printing unit for discharging heated air  
10 onto a freshly printed or coated substrate while the substrate is  
11 in contact with the impression cylinder of the first printing  
12 unit;

13 a second dryer mounted adjacent the transfer drum  
14 for discharging heated air onto a freshly printed or coated  
15 substrate after it has been transferred from the impression  
16 cylinder of the first printing unit and while it is in contact  
17 with the transfer drum; and,

18 a third dryer disposed adjacent the impression  
19 cylinder of the second printing unit for discharging heated air

20 onto a freshly printed or coated substrate after it has been  
21 transferred from the transfer drum and while it is in contact with  
the impression cylinder of the second printing unit.

1 67. A rotary offset printing press of the type  
2 including first and second consecutive printing units, wherein the  
3 second printing unit is a lithographic printing unit having a  
4 lithographic printing plate, a dampener for transferring dampening  
5 solution to the lithographic printing plate, and an inking roller  
6 train for transferring lithographic printing ink to the litho-  
7 graphic plate, characterized in that the first printing unit  
8 comprising:

9 a plate cylinder having a flexographic printing  
10 plate mounted thereon;

11 a blanket cylinder having a blanket or relief plate  
12 disposed in ink or coating transfer engagement with the flexo-  
13 graphic printing plate for receiving aqueous or flexographic  
14 printing ink or coating material from the flexographic printing  
15 plate;

16 applicator means mounted on the press and coupled  
17 to the blanket or relief plate for applying aqueous or flexo-  
18 graphic printing ink or coating material over the aqueous or  
19 flexographic printing ink or coating material on the blanket or  
20 the relief plate; and,

21 an impression cylinder disposed adjacent the  
22 blanket cylinder thereby forming a nip between the blanket or  
23 relief plate and the impression cylinder whereby printing ink or  
24 coating material can be transferred from the blanket or relief  
25 plate to a substrate as the substrate is transferred through the  
26 nip;

27 wherein the printing press further includes:

28 transfer cylinder means mounted on the printing  
29 press and coupled in substrate transfer relation with the  
30 impression cylinder of the first printing unit and with the  
31 impression cylinder of the second printing unit; and,

32                   dryer means mounted on the printing press for  
33   discharging heated air onto a freshly printed or coated substrate  
34   before it is printed, coated or otherwise processed on the second  
   printing unit.

1                   68. A printing press as defined in claim 67, wherein:  
2                   said dryer means include a dryer mounted adjacent  
3   the impression cylinder of the first printing unit for discharging  
4   heated air onto a freshly printed or coated substrate while the  
5   substrate is in contact with the impression cylinder of the first  
   printing unit.

1                   69. A printing press as defined in claim 67, wherein:  
2                   said dryer means include an interunit dryer is  
3   disposed adjacent the transfer cylinder means for discharging  
4   heated air onto a freshly printed or coated substrate after it has  
5   been transferred from the first printing unit and while it is in  
   contact with the transfer cylinder means.

1                   70. A printing press as defined in claim 67, including:  
2                   an extractor coupled to the dryer means for  
3   extracting hot air and moisture vapors from an exposure zone  
4   between the dryer means and the freshly printed or coated  
   substrate.

1                   71. A printing press as defined in claim 67, wherein:  
2                   said transfer cylinder means include a transfer  
3   drum is coupled in substrate transfer relation with the impression  
4   cylinder of the first printing unit and in substrate transfer  
5   relation with the impression cylinder of the second printing unit;  
6                   said dryer means include:  
7                   a first dryer mounted on the press adjacent the  
8   impression cylinder of the first printing unit for discharging  
9   heated air onto a freshly printed or coated substrate while the

10 substrate is in contact with the impression cylinder of the first  
11 printing unit;

12 a second dryer mounted on the press adjacent the  
13 transfer drum for discharging heated air onto a freshly printed or  
14 coated substrate after it has been transferred from the impression  
15 cylinder of the first printing unit and while it is in contact  
16 with the transfer drum; and,

17 a third dryer mounted on the press adjacent the  
18 impression cylinder of the second printing unit for discharging  
19 heated air onto a freshly printed or coated substrate after it has  
20 been transferred from the transfer drum and while it is in contact  
with the impression cylinder of the second printing unit.

1 72. A rotary offset printing press having a printing  
2 unit comprising:

3 a plate cylinder having a waterless printing plate  
4 mounted thereon;

5 inking/coating apparatus coupled to the waterless  
6 printing plate for transferring aqueous or flexographic printing  
7 ink or coating material onto the waterless printing plate;

8 a blanket cylinder having an ink or coating  
9 receptive blanket or relief plate disposed in ink or coating  
10 transfer engagement with the waterless printing plate for  
11 receiving aqueous or flexographic printing ink or coating material  
12 from the waterless printing plate;

13 an impression cylinder disposed adjacent the  
14 blanket cylinder thereby forming a nip between the blanket or  
15 relief plate and the impression cylinder whereby aqueous or  
16 flexographic printing ink or coating material can be transferred  
17 from the blanket or relief plate to a substrate as the substrate  
18 is transferred through the nip;

19 a supply container for containing a volume of  
20 aqueous or flexographic ink or coating material;

21 circulation means coupled between the supply  
22 container and the inking/coating apparatus for inducing the flow

23 of aqueous or flexographic ink or coating material from the supply  
24 container to the inking/coating apparatus and for returning ink or  
25 coating material from the inking/coating apparatus to the supply  
26 container; and,  
27 heat exchanger means coupled to the circulation  
28 means for maintaining the temperature of the aqueous or flexo-  
29 graphic ink or coating material within a predetermined temperature  
range.

1 73. A method for printing or coating a substrate in a  
2 rotary offset printing press of the type including a printing unit  
3 having a plate cylinder, a flexographic printing plate mounted on  
4 the plate cylinder, a blanket cylinder, a plate or blanket mounted  
5 on the blanket cylinder, an impression cylinder, and ink-  
6 ing/coating apparatus for applying flexographic or aqueous  
7 printing ink or coating material to the flexographic printing  
8 plate and/or to the plate or blanket on the blanket cylinder,  
9 comprising the following steps:

10 applying a first down film or layer of flexographic  
11 or aqueous printing ink or coating material to the flexographic  
12 printing plate;

13 transferring printing ink or coating material from  
14 the flexographic printing plate to the plate or blanket on the  
15 blanket cylinder;

16 applying a second down film or layer of aqueous or  
17 flexographic printing ink or coating material over the first down  
18 film or layer on the plate or blanket on the blanket cylinder;

19 transferring ink or coating material from the  
20 blanket or plate on the blanket cylinder onto a substrate as the  
21 substrate is transferred through the nip between the blanket  
22 cylinder and the impression cylinder; and,

23 drying the freshly printed or coated substrate  
24 before the substrate is subsequently printed, coated or otherwise  
processed.

1           74. A method of printing or coating a substrate in a  
2 rotary offset printing press as set forth in claim 73, wherein the  
3 printing unit is the last printing unit of the rotary offset  
4 printing press and a delivery cylinder is mounted on the last  
5 printing unit for transferring the freshly printed substrate along  
6 a substrate travel path, including the steps:  
7           modifying the delivery cylinder by mounting a plate  
8 or blanket on the delivery cylinder;  
9           transferring ink or coating material to the plate  
10 or blanket on the modified delivery cylinder; and  
11           transferring a third down film or layer of aqueous  
12 or flexographic printing ink or coating material from the plate or  
13 blanket over the second down film or layer simultaneously while  
14 the freshly printed or coated substrate is on the last impression  
cylinder of the last printing unit.

1           75. A printing press having a last printing unit  
2 comprising, in combination:  
3           a plate cylinder having a printing plate mounted  
4 thereon;  
5           a blanket cylinder having a blanket disposed in  
6 inking or coating transfer engagement with the printing plate;  
7           an impression cylinder disposed adjacent the  
8 blanket cylinder thereby forming a nip between the blanket  
9 cylinder and the impression cylinder wherein printing ink or  
10 coating material can be transferred from the blanket onto a  
11 substrate as the substrate is transferred through the nip;  
12           a first inking/coating apparatus disposed on the  
13 dampener side of the last printing unit and movably coupled to the  
14 last printing unit for movement to an on-impression operative  
15 position and to an off-impression retracted position;  
16           the first inking/coating apparatus including  
17 applicator means for applying ink or coating material to the  
18 printing plate mounted on the plate cylinder or to a plate or  
19 blanket mounted on the blanket cylinder, either separately or

20 simultaneously, when the first inking/coating apparatus is in the  
21 operative position;

22 an inking/coating cylinder mounted on the last  
23 printing unit;

24 a plate or blanket mounted on the inking/coating  
25 cylinder for printing ink or coating material onto a freshly  
26 printed or coated substrate while the substrate is on the  
27 impression cylinder of the last printing unit; and,

28 a second inking/coating apparatus mounted on the  
29 delivery side of the last printing unit, the second inking/coating  
30 apparatus including applicator means for transferring ink or  
31 coating material to the plate or blanket on the inking/coating  
cylinder.

1 76. A printing press as set forth in claim 75,  
2 comprising:

3 a vacuum-assisted substrate transfer apparatus  
4 mounted adjacent the inking/coating cylinder for separating the  
5 freshly overprinted or overcoated substrate from the plate or  
6 blanket as the substrate transfers through the nip between the  
plate or blanket and the last impression cylinder.

1 77. A method for printing or coating a substrate on the  
2 last printing unit of a rotary offset printing press of the type  
3 including a plate cylinder, a printing plate mounted on the plate  
4 cylinder, a blanket cylinder, a plate or blanket mounted on the  
5 blanket cylinder, an impression cylinder, inking/coating apparatus  
6 for applying printing ink or coating material simultaneously or  
7 separately to the flexographic printing plate and/or to the plate  
8 or blanket on the blanket cylinder, and including an ink-  
9 ing/coating cylinder mounted adjacent the last printing unit for  
10 printing a film of ink or layer of coating material over a freshly  
11 printed substrate, comprising the steps:

12 applying a first down film of printing ink or layer  
13 of coating material to the printing plate;



14                   transferring printing ink or coating material from  
15   the printing plate to a plate or blanket on the blanket cylinder;  
16                   applying a second down film of printing ink or  
17   layer of coating material over the first down film or layer on the  
18   plate or blanket on the blanket cylinder;  
19                   transferring ink or coating material from the  
20   blanket or plate on the blanket cylinder onto a substrate as the  
21   substrate is transferred through the nip between the blanket  
22   cylinder and the impression cylinder; and  
23                   simultaneously printing a third down film of  
24   printing ink or layer of coating material over the second down  
25   film of ink or layer of coating material while the second down  
26   film or layer is being printed or coated on the last impression  
cylinder.

1                   78. Inking/coating apparatus comprising, in combina-  
2   tion:

3                   an applicator head having first and second side  
4   support members;

5                   an upper cradle assembly disposed on the first and  
6   second side support members, respectively, and a lower cradle  
7   assembly disposed on the first and second side support members,  
8   respectively;

9                   a first applicator roller mounted for rotation on  
10   the upper cradle assembly for applying ink or coating material to  
11   a plate mounted on the plate cylinder when the inking/coating  
12   apparatus is in the operative position; and,

13                   a second applicator roller mounted for rotation on  
14   the lower cradle assembly for applying ink or coating material to  
15   a plate or a blanket mounted on the blanket cylinder when the  
inking/coating apparatus is in the operative position.

1                   79. In a printing press of the type having first and  
2   second side frame members forming a printing unit on which a plate

3 cylinder, a blanket cylinder and an impression cylinder are  
4 supported for rotation, the improvement comprising:

5 inking/coating apparatus movably coupled to the  
6 printing unit for movement to an on-impression operative position  
7 and to an off-impression retracted position;

8 upper cradle means mounted on the inking/coating  
9 apparatus for supporting a first applicator roller for engagement  
10 with a plate or blanket on the plate cylinder when the ink-  
11 ing/coating apparatus is in the operative position;

12 lower cradle means mounted on the inking/coating  
13 apparatus for supporting a second applicator roller for engagement  
14 with a plate or blanket on the blanket cylinder when the ink-  
15 ing/coating apparatus is in the operative position; and,

16 the inking/coating apparatus including first and  
17 second applicator rollers mounted on the upper and lower cradle  
18 means, respectively, for applying ink or coating material to a  
19 plate mounted on the plate cylinder, or to a plate or blanket  
20 mounted on the blanket cylinder, either separately or simulta-  
21 neously when the inking/coating apparatus is in the operative  
position.

1 80. The improvement as set forth in claim 79, includ-  
2 ing:

3 a first reservoir or fountain pan mounted on the  
4 upper cradle means;

5 the first applicator roller being disposed for  
6 rolling contact with ink or coating material in the first  
7 reservoir or fountain pan;

8 a second reservoir or fountain pan mounted on the  
9 lower cradle means;

10 the second applicator roller being disposed for  
11 rolling contact with ink or coating material in the second  
12 reservoir or fountain pan; and,

- 13 power transfer means coupled to the first and  
14 second applicator rollers for rotating said applicator rollers  
simultaneously.

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"RETRACTABLE PRINTING/COATING UNIT OPERABLE ON THE PLATE  
AND BLANKET CYLINDERS SIMULTANEOUSLY FROM THE DAMPENER  
SIDE OF THE FIRST PRINTING UNIT OR ANY CONSECUTIVE  
PRINTING UNIT OF ANY ROTARY OFFSET PRINTING PRESS"

Abstract of the Disclosure

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A retractable in-line inking/coating apparatus can apply either spot or overall inking/coating material to a plate and/or a blanket on the first printing unit or on any consecutive printing unit of any rotary offset printing press. The inking/coating apparatus is pivotally mounted within the conventional dampener space of any lithographic printing unit. The aqueous component of the flexographic printing ink or aqueous coating material is evaporated and dried by high velocity, hot air dryers and high performance heat and moisture extractors so that the aqueous or flexographic ink or coating material on a freshly printed or coated sheet is dry and can be dry-trapped on the next printing unit. The inking/coating apparatus includes dual cradles that support first and second applicator rollers so that the inking/coating apparatus can apply a double bump of aqueous/flexographic or UV-curable printing ink or coating material to a plate on the plate cylinder, while simultaneously applying aqueous, flexographic or UV-curable printing ink or coating material to a plate or a blanket on the blanket cylinder, and thereafter onto a sheet as the sheet is transferred through the nip between the blanket cylinder and the impression cylinder. A triple bump is printed or coated on the last printing unit with the aid of an impression cylinder inking/coating unit.

\* \* \* \* \*

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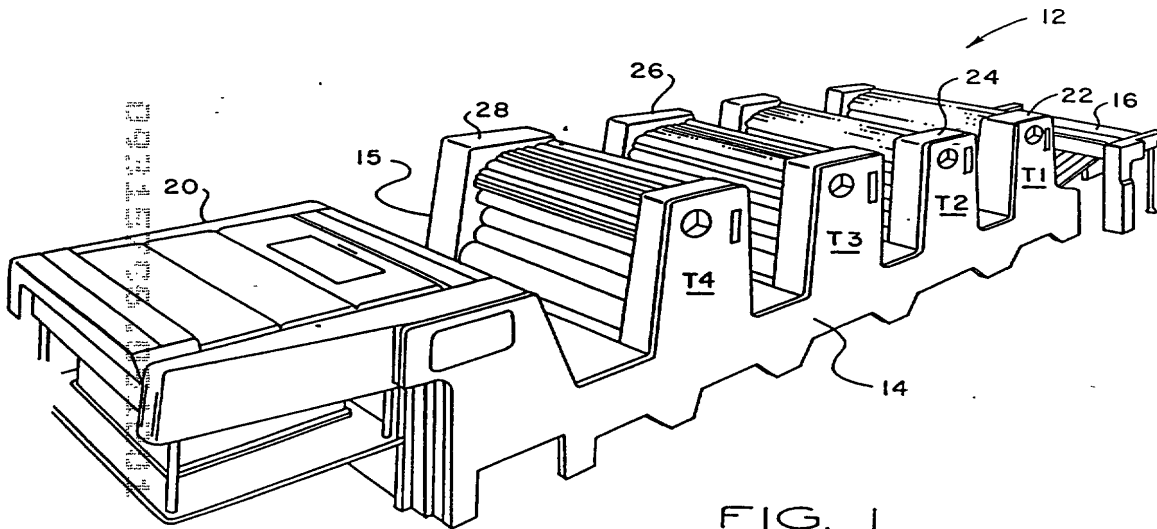


FIG. 1

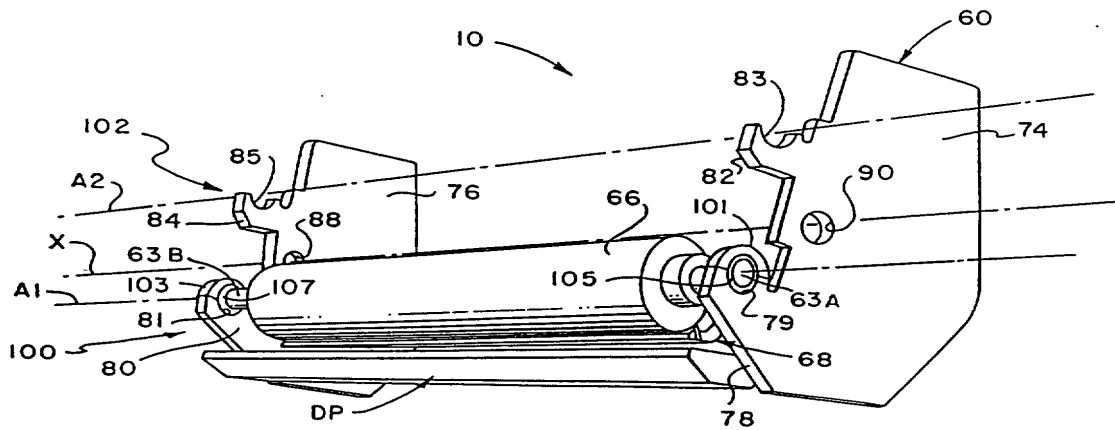


FIG. 2

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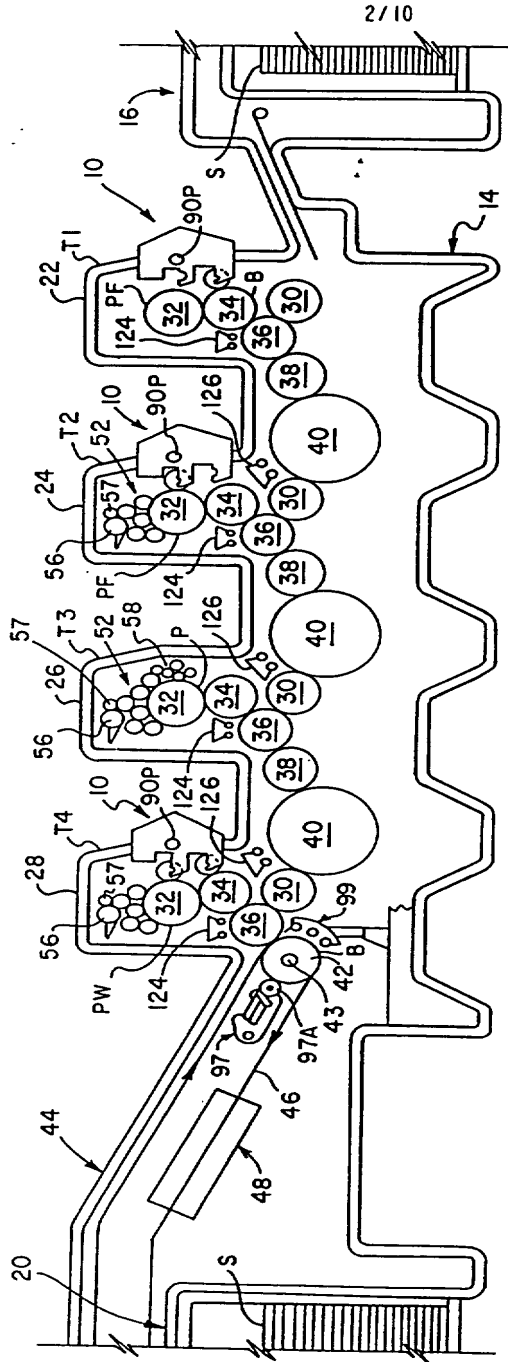
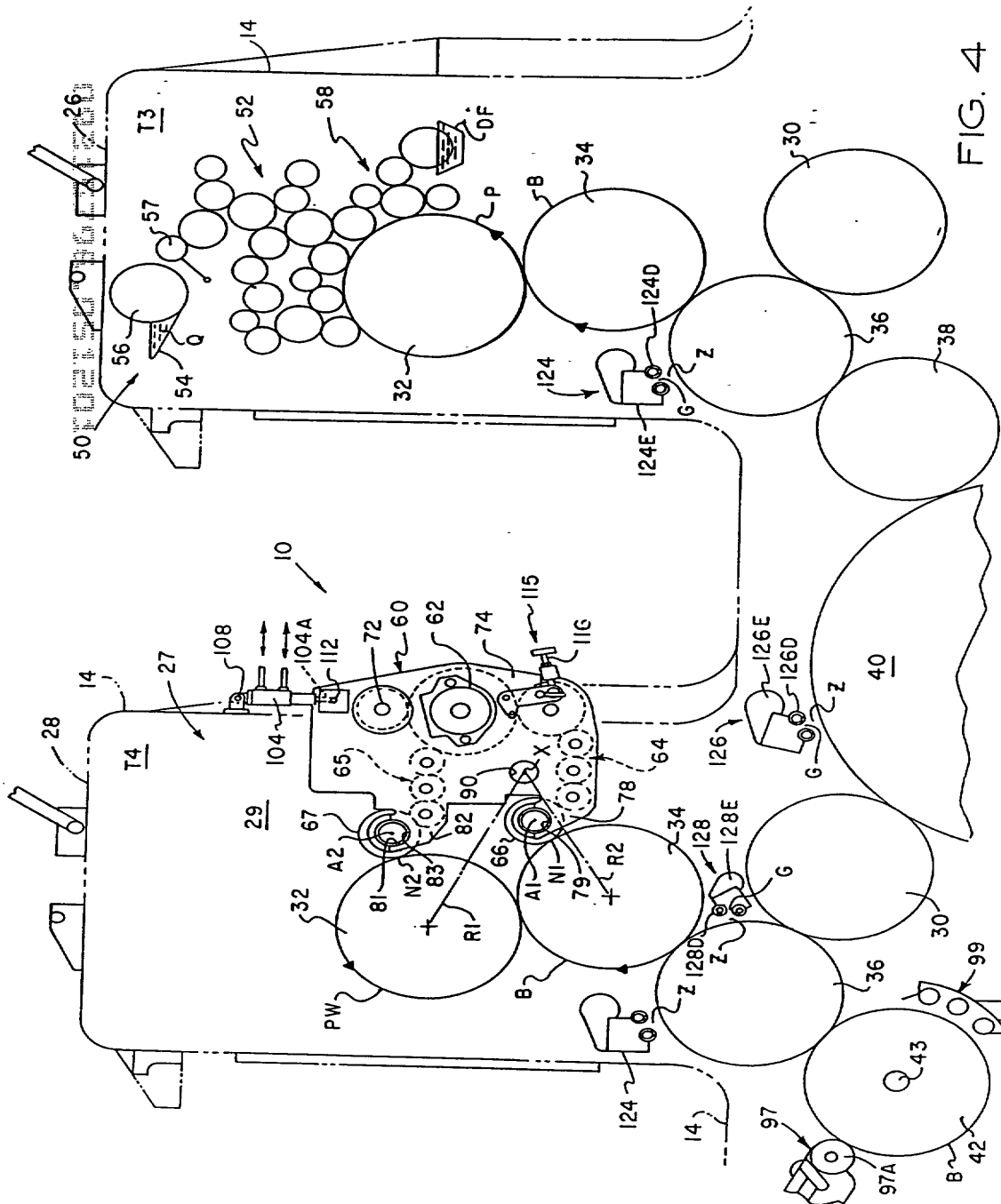


FIG. 3

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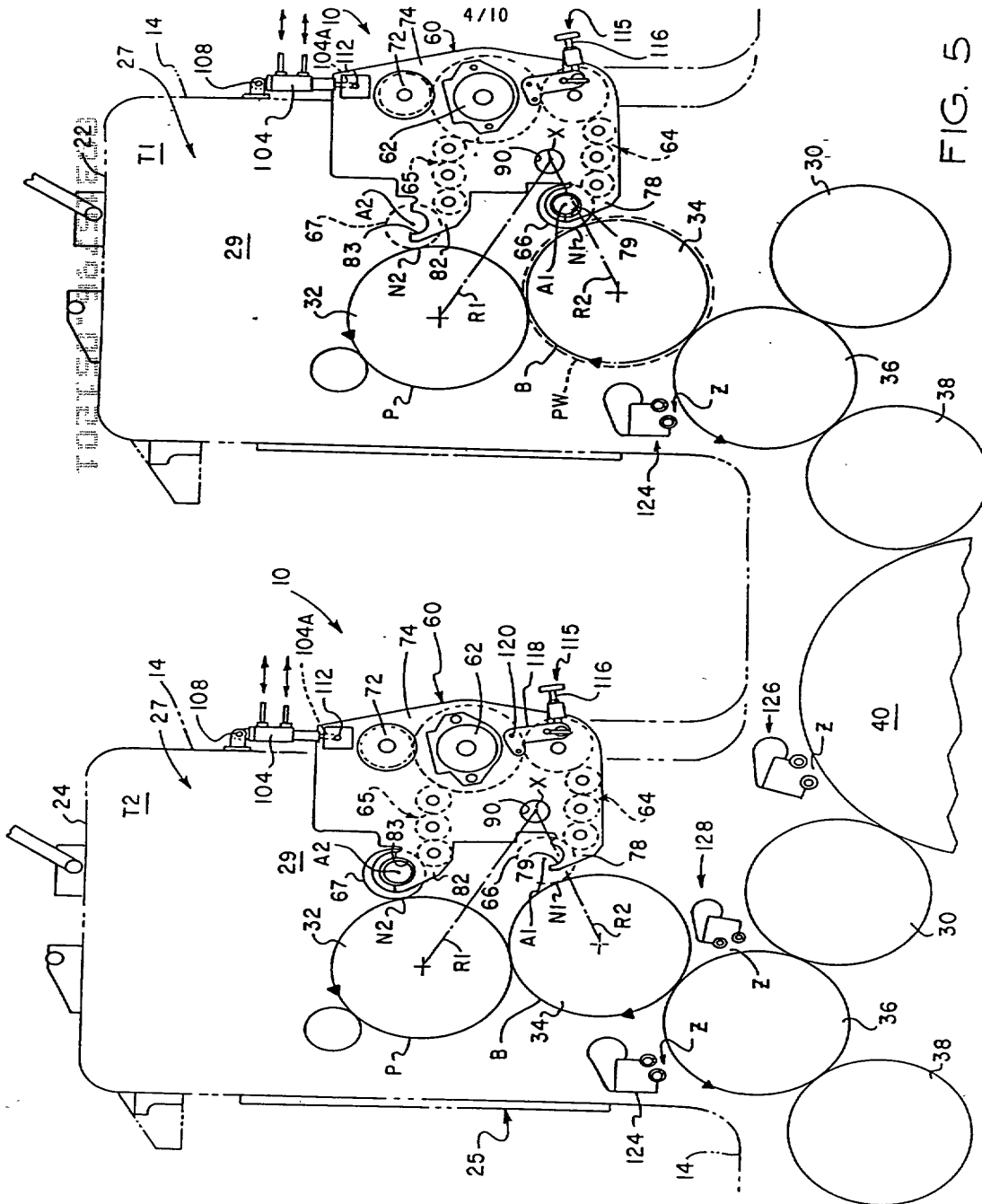


FIG. 5



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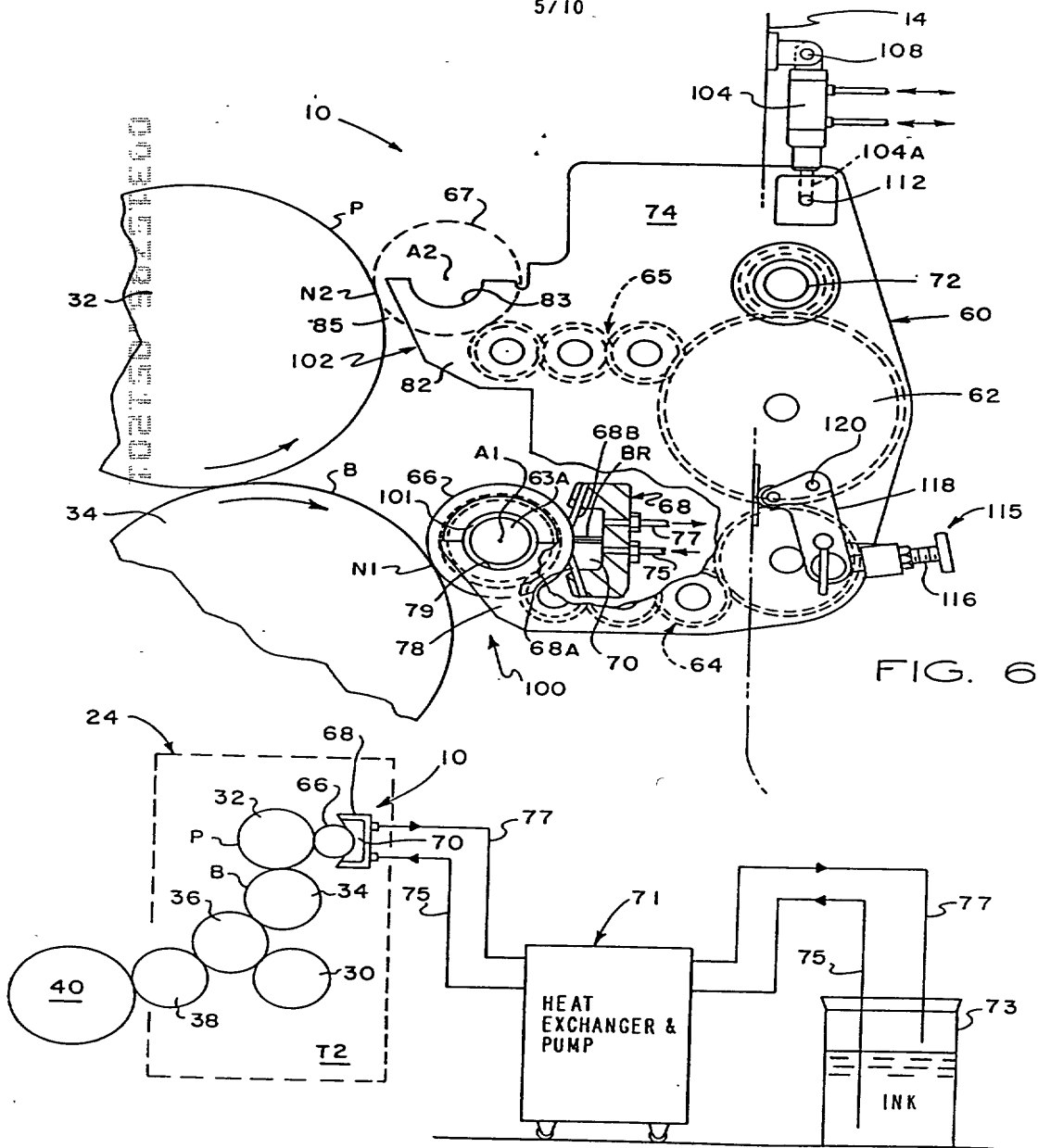


FIG. 6

FIG. 7

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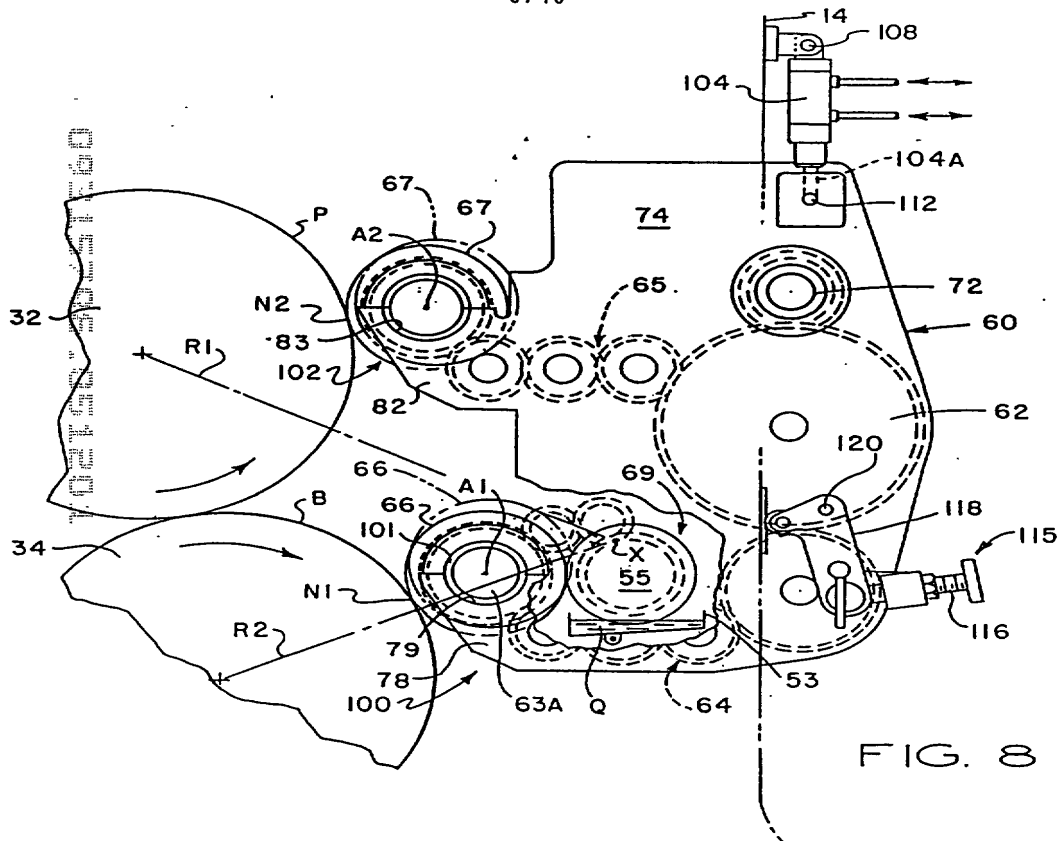


FIG. 8

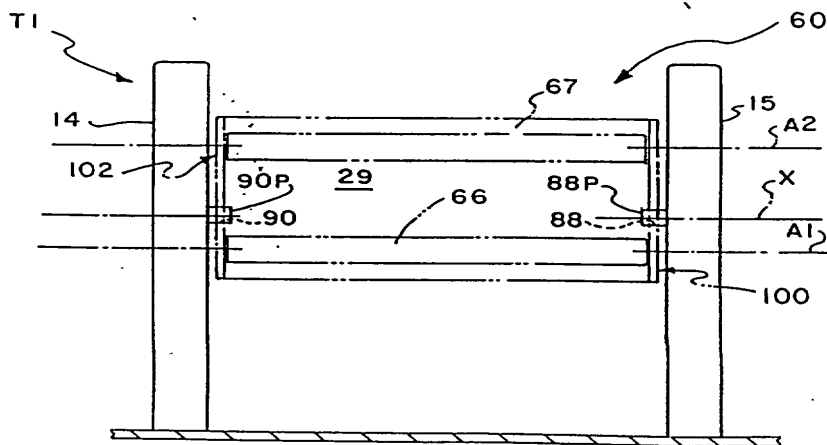


FIG. 9

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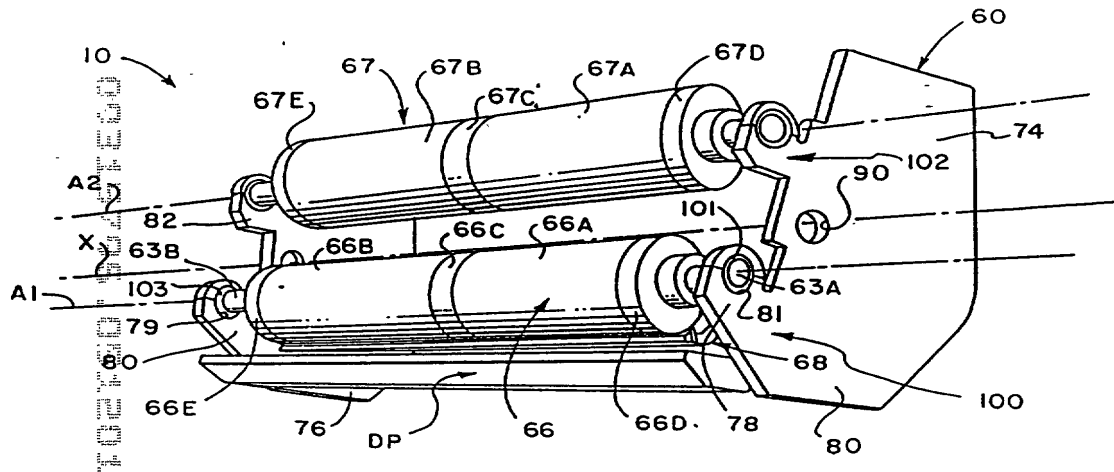


FIG. 10

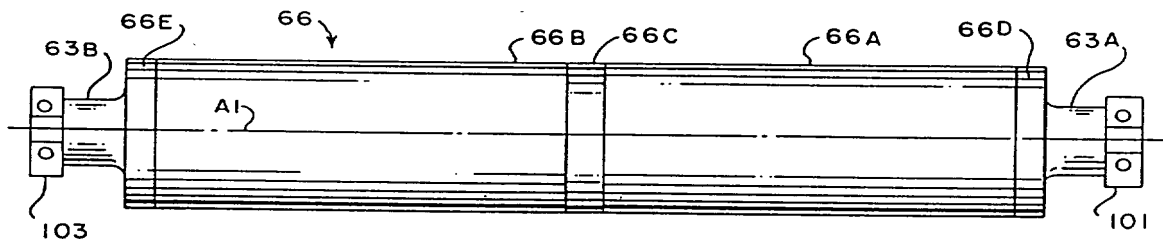


FIG. 11

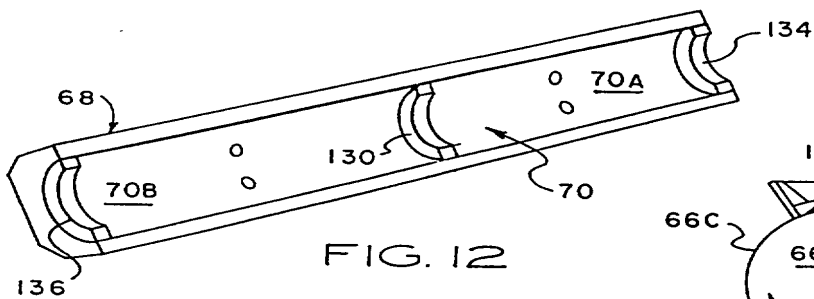


FIG. 12

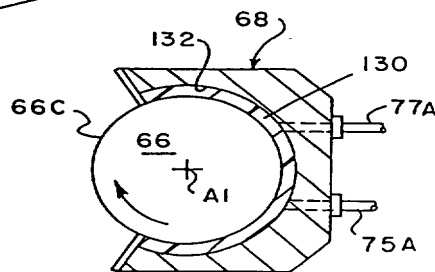


FIG. 13

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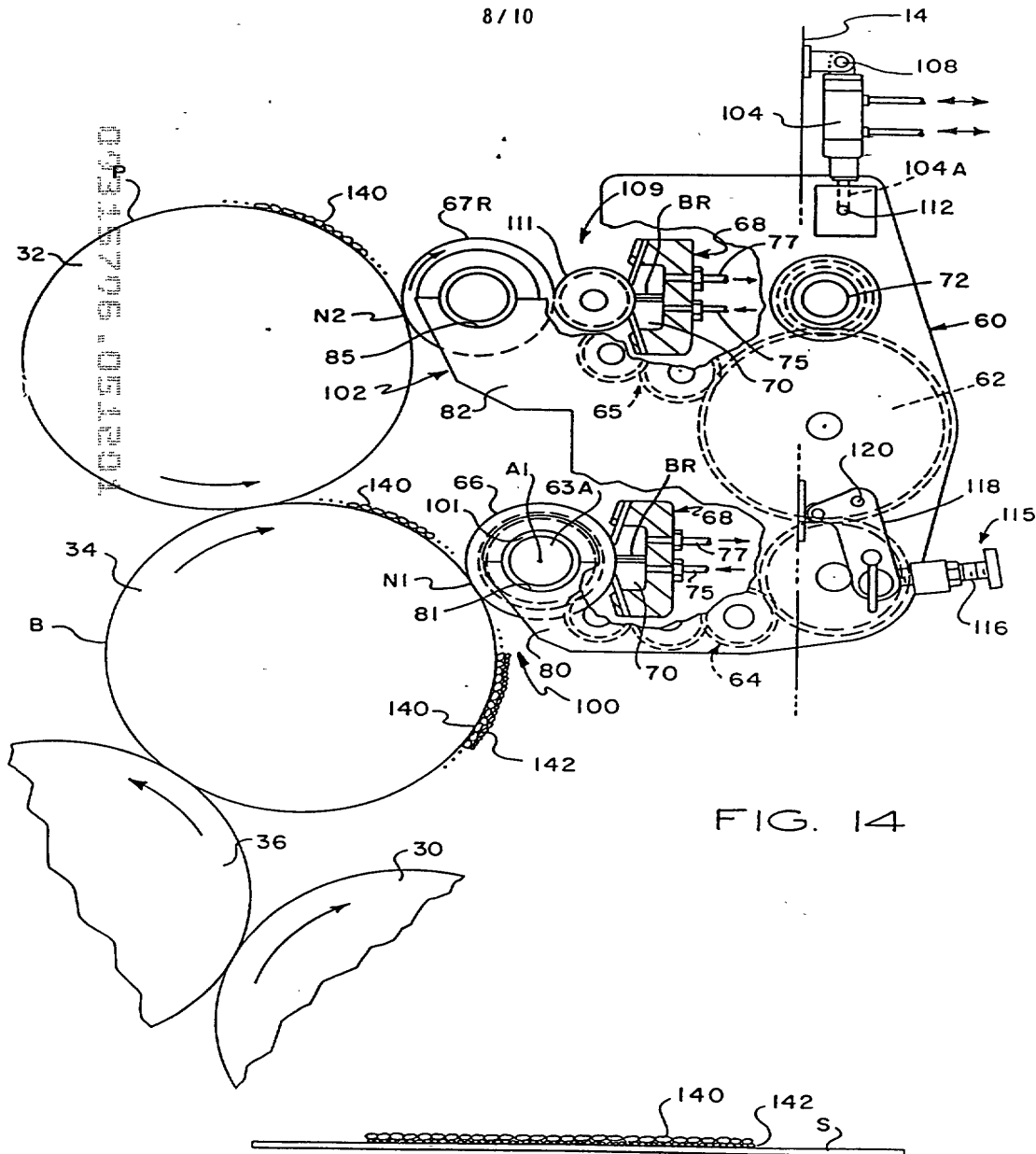


FIG. 14

FIG. 15

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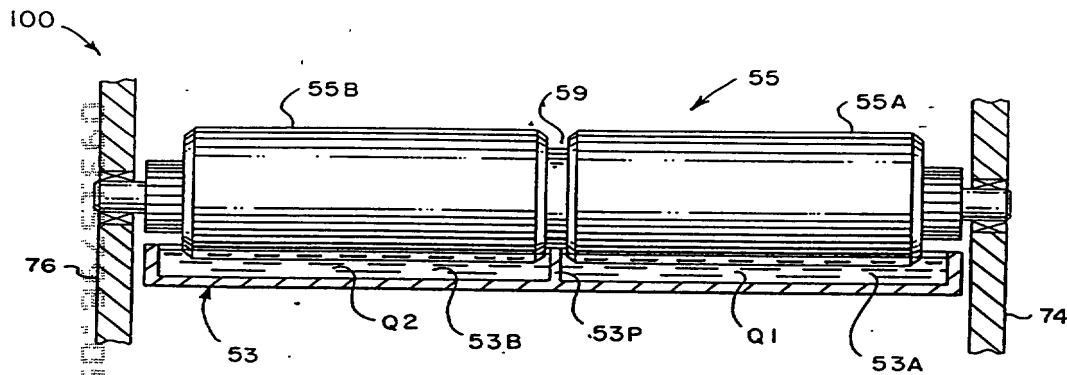


FIG. 16

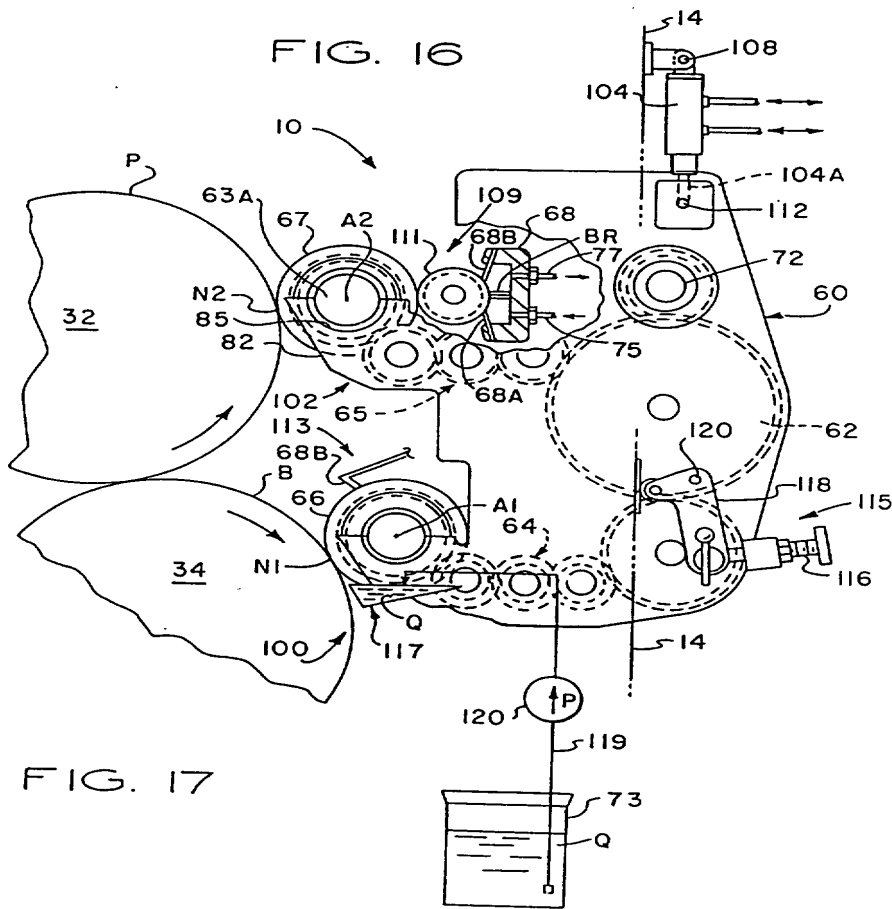


FIG. 17

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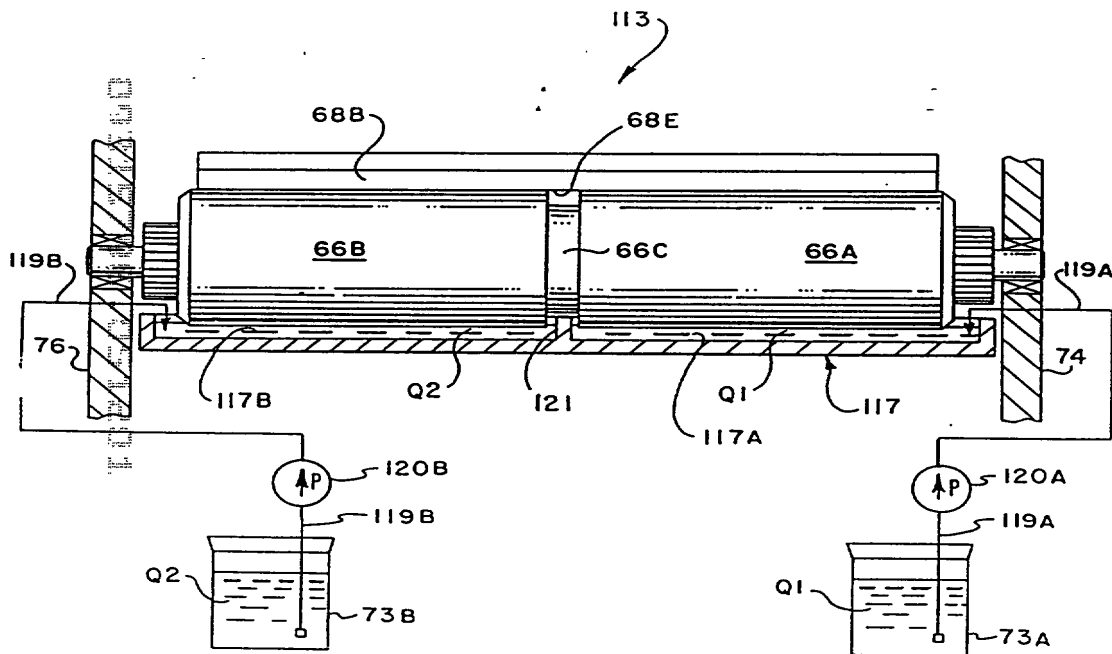


FIG. 18

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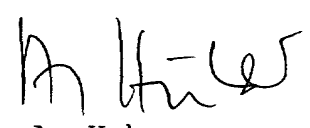
European Patent Office  
Erhardtstraße 27  
80331 München

9

Application No.: 96250217.5 oop  
Applicant : Howard W. DeMoore

Please find the following documents enclosed:

- Priority Document

  
A. Huber  
(Association No. 1)

1 x Priority  
R.T. Koerse 25. 10. 1996



**THE UNITED STATES OF AMERICA**

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United States Patent and Trademark Office**

**October 10, 1996**

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**APPLICATION NUMBER: 08/538,422**

**FILING DATE: October 2, 1995**

**By Authority of the  
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**NORMA WOODSON**  
**Certifying Officer**



08/538422

PATENT APPLICATION SERIAL NO. 08/538422

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290 SB 11/06/95 08538422  
1 201 1,045.00 CK B4039A  
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*9 201.00 67*

SE19102 12/22/95 08538422

01-0657 180 201 220.00CR

PTO-1556  
(5/87)



Attorney Docket  
No. B6038A

SPECIFICATION

accompanying

Application for Grant of U.S. Letters Patent

JOINT  
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Ronald M. Rendleman  
4331 Royal Ridge  
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John W. Bird  
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Carrollton, Texas 75007

TITLE: "RETRACTABLE PRINTING/COATING UNIT OPERABLE ON THE  
PLATE AND BLANKET CYLINDERS SIMULTANEOUSLY FROM THE  
DAMPENER SIDE OF THE FIRST PRINTING UNIT OR ANY CONSECU-  
TIVE PRINTING UNIT OF ANY ROTARY OFFSET PRINTING PRESS"

Field of the Invention

1 This invention relates generally to sheet-fed or web-  
2 fed, rotary offset lithographic printing presses, and more  
3 particularly, to a new and improved inking/coating apparatus for  
4 the in-line application of aqueous or flexographic printing inks,  
5 primer or protective/decorative coatings applied simultaneously to  
6 the plate and blanket of the first or any consecutive printing  
7 unit of any lithographic printing press.

8 Background of the Invention

9 Conventional sheet-fed, rotary offset printing presses  
10 typically include one or more printing units through which  
11 individual sheets are fed and printed. After the last printing  
12 unit, freshly printed sheets are transferred by a delivery  
13 conveyor to the delivery end of the press where the freshly  
14 printed and/or coated sheets are collected and stacked uniformly.  
15 In a typical sheet-fed, rotary offset printing press such as the  
16 Heidelberg Speedmaster line of presses, the delivery conveyor  
17 includes a pair of endless chains carrying gripper bars with

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1 gripper fingers which grip and pull freshly printed sheets from  
2 the last impression cylinder and convey the sheets to the sheet  
3 delivery stacker.

4         Since the inks used with sheet fed rotary offset  
5 printing presses are typically wet and tacky, special precautions  
6 must be taken to prevent marking and smearing of the freshly  
7 printed or coated sheets as the sheets are transferred from one  
8 printing unit to another. The printed ink on the surface of the  
9 sheet dries relatively slowly and is easily smeared during subse-  
10 quent transfer between printing units. Marking, smearing and  
11 smudging can be prevented by a vacuum assisted sheet transfer  
12 apparatus as described in the following U.S. Patents: 5,113,255;  
13 5,127,329; 5,205,217; 5,228,391; 5,243,909; and 5,419,254, all to  
14 Howard W. DeMoore, co-inventor, and manufactured and sold by  
15 Printing Research, Inc. of Dallas, Texas, U.S.A. under its  
16 trademark BACVAC™.

17         In some printing jobs, offsetting is prevented by  
18 applying a protective and/or decorative coating material over all  
19 or a portion of the freshly printed sheets. Some coatings are  
20 formed of a UV-curable or water-dispersed resin applied as a  
21 liquid solution over the freshly printed sheets to protect the ink  
22 from offsetting or set-off and improve the appearance of the  
23 freshly printed sheets. Such coatings are particularly desirable  
24 when decorative or protective finishes are applied in the printing  
25 of posters, record jackets, brochures, magazines, folding cartons  
26 and the like.

27 Description of the Prior Art

28         Various arrangements have been made for applying the  
29 coating as an in-line printing operation by using the last  
30 printing unit of the press as the coating application unit. For  
31 example, U.S. Patents 4,270,483; 4,685,414; and 4,779,557 disclose  
32 coating apparatus which can be moved into position to permit the  
33 blanket cylinder of the last printing unit of a printing press to  
34 be used to apply a coating material over the freshly printed

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1 sheets. In U.S. Patent 4,841,903 (Bird) there are disclosed  
2 coating apparatus which can be selectively moved between the plate  
3 cylinder or the blanket cylinder of the last printing unit of the  
4 press so the last printing unit can only be used for coating  
5 purposes. However, when coating apparatus of these types are  
6 being used, the last printing unit cannot be used to print ink to  
7 the sheets, but rather can only be used for the coating operation.  
8 Thus, while coating with this type of in-line coating apparatus,  
9 the printing press loses the capability of printing on the last  
10 printing unit as it is converted to a coating unit.

11 The coater of U.S. Patent 5,107,790 (Sliker et al) is  
12 retractable along an inclined rail for extending and retracting a  
13 coater head into engagement with a blanket on the blanket  
14 cylinder. Because of its size, the rail-retractable coater can  
15 only be installed between the last printing unit of the press and  
16 the delivery sheet stacker, and cannot be used for interunit  
17 coating. The coater of U.S. Patent 4,615,293 (Jahn) provides two  
18 separate, independent coaters located on the dampener side of a  
19 converted printing unit for applying lacquer to a plate and to a  
20 rubber blanket. Consequently, although a plate and blanket are  
21 provided, the coating unit of Jahn's press is restricted to a  
22 dedicated coating operation only.

23 Proposals have been made for overcoming the loss of a  
24 printing unit when in-line coating is used, for example as set  
25 forth in U.S. Patent 5,176,077 to Howard W. DeMoore (co-inventor  
26 and assignee), which discloses a coating apparatus having an  
27 applicator roller positioned to apply the coating material to the  
28 freshly printed sheet while the sheet is still on the last  
29 impression cylinder of the press. This allows the last printing  
30 unit to print and coat simultaneously, so that no loss of printing  
31 unit capability results.

32 Some conventional coaters are rail-mounted and occupy a  
33 large amount of press space and reduce access to the press.  
34 Elaborate equipment is needed for retracting such coaters from the

1 operative coating position to the inoperative position, which  
2 reduces access to the printing unit.

3 Accordingly, there is a need for an in-line ink-  
4 ing/coating apparatus which does not result in the loss of a  
5 printing unit, does not extend the length of the press, and which  
6 can print and coat aqueous and flexographic inks and coating  
7 materials simultaneously onto the plate and blanket on any litho-  
8 graphic printing unit of any lithographic printing press,  
9 including the first printing unit.

10 Objects of the Invention

11 Accordingly, a general object of the present invention  
12 is to provide improved inking/coating apparatus which is capable  
13 of selectively applying ink or coating material to a plate on a  
14 plate cylinder or ink or coating material to a plate or blanket on  
15 a blanket cylinder.

16 A specific object of the present invention is to provide  
17 improved inking/coating apparatus of the character described which  
18 is extendable into inking/coating engagement with either a plate  
19 on a plate cylinder or to a plate or blanket on a blanket  
20 cylinder.

21 A related object of the present invention is to provide  
22 improved inking/coating apparatus of the character described which  
23 is capable of being mounted on any lithographic printing unit of  
24 the press and does not interfere with operator access to the plate  
25 cylinder, blanket cylinder, or adjacent printing units.

26 Another object of the present invention is to provide  
27 improved inking/coating apparatus of the character described,  
28 which can be moved from an operative inking/coating engagement  
29 position adjacent to a plate cylinder or a blanket cylinder to a  
30 non-operative, retracted position.

31 Still another object of the present invention is to  
32 provide improved inking/coating apparatus of the character  
33 described, which can be used for applying aqueous, flexographic  
34 and ultra-violet curable inks and/or coatings in combination with

1 lithographic, flexographic and waterless printing processes on any  
2 rotary offset printing press.

3 A related object of the present invention is to provide  
4 improved inking/coating apparatus of the character described,  
5 which is capable of applying aqueous or flexographic ink or  
6 coating material on one printing unit, for example the first  
7 printing unit, and drying the ink or coating material before it is  
8 printed or coated on the next printing unit so that it can be  
9 overprinted or overcoated immediately on the next printing unit  
10 with waterless, aqueous, flexographic or lithographic inks or  
11 coating materials.

12 Yet another object of the present invention is to  
13 provide improved inking/coating apparatus for use on a multiple  
14 color rotary offset printing press that can apply ink or coating  
15 material separately and/or simultaneously to the plate and/or  
16 blanket of a printing unit of the press from a single operative  
17 position, and from a single inking/coating apparatus.

18 A related object of the present invention is to provide  
19 improved inking/coating apparatus of the character described, in  
20 which virtually no printing unit adjustment or alteration is  
21 required when the inking/coating apparatus is converted from plate  
22 to blanket printing or coating and vice versa.

23 Another object of the present invention is to provide  
24 improved inking/coating apparatus that can be operably mounted in  
25 the dampener space of any lithographic printing unit for ink-  
26 ing/coating engagement with either a plate on a plate cylinder or  
27 a plate or blanket on a blanket cylinder, and which does not  
28 interfere with operator movement or activities in the interunit  
29 space between printing units.

30 Summary of the Invention

31 The foregoing objects are achieved by a retractable, in-  
32 line inking/coating apparatus which is mounted on the dampener  
33 side of any printing unit of a rotary offset press for movement  
34 between an operative (on-impression) inking/coating position and

1 a retracted, disengaged (off-impression) position. The ink-  
2 ing/coating apparatus includes an applicator roller which is  
3 movable into and out of engagement with a plate on a plate  
4 cylinder or a blanket on a blanket cylinder. The inking/coating  
5 applicator head is pivotally coupled to a printing unit by pivot  
6 pins which are mounted on the press side frames in the traditional  
7 dampener space of the printing unit in parallel alignment with the  
8 plate cylinder and the blanket cylinder. This dampener space  
9 mounting arrangement allows the inking/coating unit to be  
10 installed between any adjacent printing units on the press.

11 In the preferred embodiment, the applicator head  
12 includes vertically spaced pairs of cradle members with one cradle  
13 pair being adapted for supporting an inking/coating applicator  
14 roller in alignment with a plate cylinder, and the other cradle  
15 pair supporting an inking/coating applicator roller in alignment  
16 with the blanket cylinder, respectively, when the applicator head  
17 is in the operative position. Because of the pivotal support  
18 provided by the pivot pins, the applicator head can be extended  
19 and retracted within the limited space available in the tradition-  
20 al dampener space, without restricting operator access to the  
21 printing unit cylinders and without causing a printing unit to  
22 lose its printing capability.

23 When the inking/coating apparatus is used in combination  
24 with a flexographic printing plate and aqueous or flexographic ink  
25 or coating material, the water component of the aqueous or  
26 flexographic ink or coating material on the freshly printed or  
27 coated sheet is evaporated and dried by a high velocity, hot air  
28 interunit dryer and a high volume heat and moisture extractor  
29 assembly so that the freshly printed ink or coating material is  
30 dry before the sheet is printed or coated on the next printing  
31 unit. This quick drying process permits a base layer or film of  
32 ink, for example opaque white or metallic (gold, silver or other  
33 metallics) ink to be printed on the first printing unit, and then  
34 overprinted on the next printing unit without back-trapping or dot  
35 gain.

1           The construction and operation of the present invention  
2 will be understood from the following detailed description taken  
3 in conjunction with the accompanying drawings which disclose, by  
4 way of example, the principles and advantages of the present  
5 invention.

6   Brief Description of the Drawings

7           FIGURE 1 is a perspective view of a sheet fed, rotary  
8 offset printing press having inking/coating apparatus embodying  
9 the present invention;

10          FIGURE 2 is a simplified perspective view of the single  
11 head, dual cradle inking/coating apparatus of the present  
12 invention;

13          FIGURE 3 is a schematic side elevational view of the  
14 printing press of Figure 1 having single head, dual cradle ink-  
15 ing/coating apparatus installed in the traditional dampener  
16 position of the first, second and last printing units;

17          FIGURE 4 is a simplified side elevational view showing  
18 the single head, dual cradle inking/coating apparatus in the  
19 operative inking/coating position for simultaneously printing or  
20 the printing plate and blanket on the fourth printing unit;

21          FIGURE 5 is a simplified side elevational view showing  
22 the single head, dual cradle inking/coating apparatus in the  
23 operative position for spot or overall inking or coating on the  
24 blanket of the first printing unit, and showing the dual cradle  
25 inking/coating apparatus in the operative position for spot or  
26 overall inking or coating on the printing plate of the second  
27 printing unit;

28          FIGURE 6 is a simplified side elevational view of the  
29 single head, dual cradle inking/coating apparatus of FIGURE 4 and  
30 FIGURE 5, partially broken away, showing the single head, dual  
31 cradle inking/coating apparatus in the operative coating position  
32 and having a sealed doctor blade reservoir assembly for spot or  
33 overall coating on the blanket;



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1           FIGURE 7 is a schematic view showing a heat exchanger  
2 and pump assembly connected to the single head, dual cradle  
3 inking/coating apparatus for circulating temperature controlled  
4 ink or coating material to the inking/coating apparatus;

5           FIGURE 8 is a side elevational view, partially broken  
6 away, and similar to FIGURE 6 which illustrates an alternative  
7 coating head arrangement;

8           FIGURE 9 is a simplified elevational view of a printing  
9 unit which illustrates pivotal coupling of the inking/coating  
10 apparatus on the printing unit side frame members;

11           FIGURE 10 is a view similar to FIGURE 2 in which a pair  
12 of split applicator rollers are mounted in the upper cradle and  
13 lower cradle, respectively;

14           FIGURE 11 is a side elevational view of a split applica-  
15 tor roller;

16           FIGURE 12 is a perspective view of a doctor blade  
17 reservoir which is centrally partitioned by a seal element;

18           FIGURE 13 is a sectional view showing sealing engagement  
19 of the split applicator roller against the partition seal element  
20 of FIGURE 12;

21           FIGURE 14 is a view similar to FIGURE 8 which illus-  
22 trates an alternative inking/coating embodiment;

23           FIGURE 15 is a simplified side elevational view of a  
24 substrate which has a bronzed-like finish which is applied by  
25 simultaneous operation of the dual applicator roller embodiment of  
26 FIGURE 14;

27           FIGURE 16 is a side elevational view, partly in section,  
28 of a pan roller having separate transfer surfaces mounted on a  
29 split fountain pan;

30           FIGURE 17 is a simplified side elevational view of the  
31 dual cradle inking/coating apparatus, partially broken away, which  
32 illustrates an alternative inking/coating head apparatus featuring  
33 a single doctor blade assembly, anilox applicator roller mounted  
34 on the lower cradle; and

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1           FIGURE 18 is a side elevational view, partly in section,  
2 of a single doctor blade anilox applicator roller assembly having  
3 separate transfer surfaces, and a split fountain pan having  
4 separate fountain compartments, with the separate fountain  
5 compartments being supplied with different inks or coating  
6 materials from separate off-press sources..

7           Detailed Description of the Preferred Embodiments

8           As used herein, the term "processed" refers to printing  
9 and coating methods which can be applied to either side of a  
10 substrate, including the application of lithographic, waterless,  
11 UV-curable, aqueous and flexographic inks and/or coatings. The  
12 term "substrate" refers to sheet and web material. Also, as used  
13 herein, the term "waterless printing plate" refers to a printing  
14 plate having image areas and non-image areas which are oleophilic  
15 and oleophobic, respectively. "Waterless printing ink" refers to  
16 an oil-based ink which does not contain a significant aqueous  
17 component. "Flexographic plate" refers to a flexible printing  
18 plate having a relief surface which is wettable by flexographic  
19 ink or coating material. "Flexographic printing ink or coating  
20 material" refers to an ink or coating material having a base  
21 constituent of either water, solvent or UV-curable liquid. "UV-  
22 curable lithographic printing ink and coating material" refers to  
23 oil-based printing inks and coating materials that can be cured  
24 (dried) photomechanically by exposure to ultraviolet radiation,  
25 and that have a semi-paste or gel-like consistency. "Aqueous  
26 printing ink or coating material" refers to an ink or coating  
27 material that predominantly contains water as a solvent, diluent  
28 or vehicle. A "relief plate" refers to a printing plate having  
29 image areas which are raised relative to non-image areas which are  
30 recessed.

31           As shown in the exemplary drawings, the present  
32 invention is embodied in a new and improved in-line inking/coating  
33 apparatus, herein generally designated 10, for applying aqueous,  
34 flexographic or UV-curable inks or protective and/or decorative

1 coatings to sheets or webs printed in a sheet-fed or web-fed,  
2 rotary offset printing press, herein generally designated 12. In  
3 this instance, as shown in FIGURE 1, the inking/coating apparatus  
4 10 is installed in a four unit rotary offset printing press 12,  
5 such as that manufactured by Heidelberger Druckmaschinen AG of  
6 Germany under its designation Heidelberg Speedmaster SM102 (40",  
7 102cm).

8 The press 12 includes a press frame 14 coupled at one  
9 end, herein the right end, to a sheet feeder 16 from which sheets,  
10 herein designated S, are individually and sequentially fed into  
11 the press, and at the opposite end, with a sheet delivery stacker  
12 20 in which the freshly printed sheets are collected and stacked.  
13 Interposed between the sheet feeder 16 and the sheet delivery  
14 stacker 20 are four substantially identical sheet printing units  
15 22, 24, 26 and 28 which can print four different colors onto the  
16 sheets as they are transferred through the press 12. The printing  
17 units are housed within printing towers T1, T2, T3 and T4 formed  
18 by side frame members 14, 15. Each printing tower has a delivery  
19 side 25 and a dampener side 27. A dampener space 29 is partially  
20 enclosed by the side frames on the dampener side of the printing  
21 unit.

22 As illustrated, the printing units 22, 24, 26 and 28 are  
23 substantially identical and of conventional design. The first  
24 printing unit 22 includes an in-feed transfer cylinder 30, a plate  
25 cylinder 32, a blanket cylinder 34 and an impression cylinder 36,  
26 all supported for rotation in parallel alignment between the press  
27 side frames 14, 15 which define printing unit towers T1, T2, T3  
28 and T4. Each of the first three printing units 22, 24 and 26 have  
29 a transfer cylinder 38 disposed to transfer the freshly printed  
30 sheets from the adjacent impression cylinder and transfer the  
31 freshly printed sheets to the next printing unit via an intermedi-  
32 ate transfer drum 40.

33 The last printing unit 28 includes a delivery cylinder  
34 42 mounted on a delivery shaft 43. The delivery cylinder 42  
35 supports the freshly printed sheet 18 as it is transferred from

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1 the last impression cylinder 36 to a delivery conveyor system,  
2 generally designated 44, which transfers the freshly printed sheet  
3 to the sheet delivery stacker 20. To prevent smearing during  
4 transfer, a flexible covering is mounted on the delivery cylinder  
5 42, as described and claimed in U.S. Patent 4,402,267 to Howard W.  
6 DeMoore, which is incorporated herein by reference. The flexible  
7 covering is manufactured and sold by Printing Research, Inc. of  
8 Dallas, Texas, U.S.A., under its trademark SUPER BLUE®. Optional-  
9 ly, a vacuum-assisted sheet transfer assembly manufactured and  
10 sold by Printing Research, Inc. of Dallas, Texas, U.S.A., under  
11 its trademark BACVAC® can be substituted for the delivery transfer  
12 cylinder 42 and flexible covering.

13 The delivery conveyor system 44 as shown in FIGURE 2 is  
14 of conventional design and includes a pair of endless delivery  
15 gripper chains 46, only one of which is shown carrying at regular  
16 spaced locations along the chains, laterally disposed gripper bars  
17 having gripper fingers used to grip the leading edge of a freshly  
18 printed or coated sheet 18 after it leaves the nip between the  
19 impression cylinder 36 and delivery cylinder 42 of the last  
20 printing unit 28. As the leading edge is gripped by the gripper  
21 fingers, the delivery chains 46 pull the sheet away from the last  
22 impression cylinder 36 and convey the freshly printed or coated  
23 sheet to the sheet delivery stacker 20.

24 Prior to reaching the delivery sheet stacker, the  
25 freshly printed and/or coated sheets S pass under a delivery dryer  
26 48 which includes a combination of infra-red thermal radiation,  
27 high velocity hot air flow and a high performance heat and  
28 moisture extractor for drying the ink and/or the protec-  
29 tive/decorative coating. Preferably, the delivery dryer 48,  
30 including the high performance heat and moisture extractor is  
31 constructed as described in U.S. Application Serial Number  
32 08/116,711, filed September 3, 1993, entitled "Infra-Red Forced  
33 Air Dryer and Extractor" by Howard C. Secor, Ronald M. Rendleman  
34 and Paul D. Copenhagen, commonly assigned to the assignee of the  
35 present invention, Howard W. DeMoore, and licensed to Printing

1 Research, Inc. of Dallas, Texas, U.S.A., which manufactures and  
2 markets the delivery dryer 48 under its trademark AIR BLANKET™.

3 In the exemplary embodiment shown in FIGURE 3, the first  
4 printing unit 22 has a flexographic printing plate PF mounted on  
5 the plate cylinder, and therefore neither an inking roller train  
6 nor a dampening system is required. A flexographic printing plate  
7 PF is also mounted on the plate cylinder of the second printing  
8 unit 24. The form rollers of the inking roller train 52 shown  
9 mounted on the second printing unit 24 are retracted and locked  
10 off to prevent plate contact. Flexographic ink is supplied to the  
11 flexographic plate PF of the second printing unit 24 by the ink-  
12 ing/coating apparatus 10.

13 A suitable flexographic printing plate PF is offered by  
14 E.I. du Pont de Nemours of Wilmington, Delaware, U.S.A., under its  
15 trademark CYREL®. Another source is BASF Aktiengesellschaft of  
16 Ludwigshafen, Germany, which offers a suitable flexographic  
17 printing plate under its trademark NYLOFLEX®.

18 The third printing unit 26 as illustrated in FIGURE 3  
19 and FIGURE 4 is equipped for lithographic printing and includes an  
20 inking apparatus 50 having an inking roller train 52 arranged to  
21 transfer ink Q from an ink fountain 54 to a lithographic plate P  
22 mounted on the plate cylinder 32. This is accomplished by a  
23 fountain roller 56 and a ductor roller 57. The fountain roller 56  
24 projects into the ink fountain 54, whereupon its surface picks up  
25 ink. The lithographic printing ink Q is transferred from the  
26 fountain roller 56 to the inking roller train 52 by the ductor  
27 roller 57. The inking roller train 52 supplies ink Q to the image  
28 areas of the lithographic printing plate P.

29 The lithographic printing ink Q is transferred from the  
30 lithographic printing plate P to an ink receptive blanket B which  
31 is mounted on the blanket cylinder 34. The inked image carried on  
32 the blanket B is transferred to a substrate S as the substrate is  
33 transferred through the nip between the blanket cylinder 34 and  
34 the impression cylinder 36.

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1           The inking roller arrangement 52 illustrated in FIGURE  
2 3 and FIGURE 4 is exemplary for use in combination with litho-  
3 graphic ink printing plates P. It is understood that a dampening  
4 system 58 having a dampening fluid reservoir DF is coupled to the  
5 inking roller train 52 (FIGURE 4), but is not required for water-  
6 less or flexographic printing.

7           The plate cylinder 32 of printing unit 28 is equipped  
8 with a waterless printing plate PW. Waterless printing plates are  
9 also referred to as dry planographic printing plates and are  
10 disclosed in the following U.S. patents: 3,910,187; Re. 30,670;  
11 4,086,093; and 4,853,313. Suitable waterless printing plates can  
12 be obtained from Toray Industries, Inc. of Tokyo, Japan. A  
13 dampening system is not used for waterless printing, and waterless  
14 (oil-based) printing ink is used. The waterless printing plate PW  
15 has image areas and non-image areas which are oleophilic/hydro-  
16 philic and oleophobic/hydrophobic, respectively. The waterless  
17 printing plate PW is engraved or etched, with the image areas  
18 being recessed with respect to the non-image areas. The image  
19 area of the waterless printing plate PW is rolled-up with the  
20 flexographic or aqueous printing ink which is transferred by the  
21 applicator roller 66. Both aqueous and oil-based inks and  
22 coatings are repelled from the non-image areas, and are retained  
23 in the image areas. The printing ink or coating is then trans-  
24 ferred from the image areas to an ink or coating receptive blanket  
25 B and is printed or coated onto a substrate S.

26           For some printing jobs, a flexographic plate PF or a  
27 waterless printing plate PW is mounted over a resilient packing  
28 such as the blanket B on the blanket cylinder 34, for example as  
29 indicated by phantom lines in printing unit 22 of FIGURE 5. An  
30 advantage of this alternative embodiment is that the waterless  
31 plate PW or the flexographic plate PF are resiliently supported  
32 over the blanket cylinder by the underlying blanket B or other  
33 resilient packing. The radial deflection and give of the  
34 resilient blanket B provides uniform, positive engagement between

1 the applicator roller 66 and a flexographic plate or waterless  
2 plate.

3 In that arrangement, a plate is not mounted on the plate  
4 cylinder 32; instead, a waterless plate PW is mounted on the  
5 blanket cylinder. and the inked image on the waterless printing  
6 plate is not offset but is instead transferred directly from the  
7 waterless printing plate PW to the substrate S. The water  
8 component of flexographic ink on the freshly printed sheet is  
9 evaporated by high velocity, hot air dryers and high volume heat  
10 and moisture extractors so that the freshly printed aqueous or  
11 flexographic ink is dried before the substrate is printed on the  
12 next printing unit.

13 Referring now to FIGURE 2, FIGURE 3 and FIGURE 9, the  
14 inking/coating apparatus 10 is pivotally mounted on the side  
15 frames 14, 15 for rotation about an axis X. The inking/coating  
16 apparatus 10 includes a frame 60, a hydraulic motor 62, a lower  
17 gear train 64, an upper gear train 65, an applicator roller 66, a  
18 sealed doctor blade assembly 68 (FIGURE 6), and a drip pan DP, all  
19 mounted on the frame 60. The external peripheral surface of the  
20 applicator roller 66 is wetted by contact with liquid coating  
21 material or ink contained in a reservoir 70.

22 The hydraulic motor 62 drives the applicator roller 66  
23 synchronously with the plate cylinder 32 and the blanket cylinder  
24 34 in response to an RPM control signal from the press drive (not  
25 illustrated) and a feedback signal developed by a tachometer 72.  
26 While a hydraulic drive motor is preferred, other drive means such  
27 as an electric drive motor or an equivalent can be used.

28 When using waterless printing plate systems, the  
29 temperature of the waterless printing ink and of the waterless  
30 printing plate must be closely controlled for good image reproduc-  
31 tion. For example, for waterless offset printing with TORAY  
32 waterless printing plates PW, it is absolutely necessary to  
33 control the waterless printing plate surface and waterless ink  
34 temperature to a very narrow range, for example 24°C (75°F) to  
35 27°C (80°F).

1 Referring to FIGURE 7, the reservoir 70 is supplied with  
2 ink or coating which is temperature controlled by a heat exchanger  
3 71. The temperature controlled ink or coating material is  
4 circulated by a positive displacement pump, for example a  
5 peristaltic pump, through the reservoir 70 and heat exchanger 71  
6 from a source 73 through a supply conduit 75 and a return conduit  
7 77. The heat exchanger 71 cools or heats the ink or coating  
8 material and maintains the ink or coating and the printing plate  
9 within the desired narrow temperature range.

10 According to one aspect of the present invention,  
11 aqueous/flexographic ink or coating material is supplied to the  
12 applicator roller 66, which transfers the aqueous/flexographic ink  
13 or coating material to the printing plate (FIGURE 7), which may be  
14 a waterless printing plate or a flexographic printing plate. When  
15 the inking/coating apparatus is used for applying aque-  
16 ous/flexographic ink or coating material to a waterless printing  
17 plate PW, the inking roller train 52 is not required, and is  
18 retracted away from the printing plate. Because the viscosity of  
19 aqueous/flexographic printing ink or coating material varies with  
20 temperature, it is necessary to heat or cool the aque-  
21 ous/flexographic printing ink or coating material to compensate  
22 for ambient temperature variations to maintain the ink viscosity  
23 in a preferred operating range.

24 For example, the temperature of the printing press can  
25 vary from around 60°F (15°C) in the morning, to around 85°F (29°C)  
26 or more in the afternoon. The viscosity of aqueous/flexographic  
27 printing ink or coating material can be marginally high when the  
28 ambient temperature of the press is near 60°F (15°C), and the  
29 viscosity can be marginally low when the ambient temperature of  
30 the press exceeds 85°F (29°C). Consequently, it is desirable to  
31 control the temperature of the aqueous/flexographic printing ink  
32 or coating material so that it will maintain the surface tempera-  
33 ture of waterless printing plates within the specified temperature  
34 range. Moreover, the ink/coating material temperature should be  
35 controlled to maintain the tack of the aqueous/flexographic



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1 printing ink or coating material within a desired range when the  
2 ink or coating material is being used in connection with flexo-  
3 graphic printing processes.

4 The applicator roller 66 is preferably an anilox fluid  
5 metering roller which transfers measured amounts of printing ink  
6 or coating material to a plate or blanket. The surface of an  
7 anilox roller is engraved with an array of closely spaced, shallow  
8 depressions referred as "cells". Ink or coating from the  
9 reservoir 70 flows into the cells as the anilox roller turns  
10 through the reservoir. The transfer surface of the anilox roller  
11 is "doctored" (wiped or scraped) by dual doctor blades 68A, 68B to  
12 remove excess ink or coating material. The ink or coating metered  
13 by the anilox roller is that contained within the cells. The dual  
14 doctor blades 68A, 68B also seal the supply reservoir 70.

15 The anilox applicator roller 66 is cylindrical and may  
16 be constructed in various diameters and lengths, containing cells  
17 of various sizes and shapes. The volumetric capacity of an anilox  
18 roller is determined by cell size, shape and number of cells per  
19 unit area. Depending upon the intended application, the cell  
20 pattern may be fine (many small cells per unit area) or coarse  
21 (fewer large cells per unit area).

22 By supplying the ink or coating material through the  
23 inking/coating apparatus 10, more ink or coating material can be  
24 applied to the sheet S as compared with the inking roller train of  
25 a lithographic printing unit. Moreover, color intensity is  
26 stronger and more brilliant because the aqueous or flexographic  
27 ink or coating material is applied at a much heavier film  
28 thickness or weight than can be applied by the lithographic  
29 process, and the aqueous or flexographic colors are not diluted by  
30 dampening solution.

31 Preferably, the sealed doctor blade assembly 68 is con-  
32 structed as described in U.S. Patent 5,176,077 to Howard W.  
33 DeMoore, co-inventor and assignee, which is incorporated herein by  
34 reference. An advantage of using a sealed reservoir is that fast  
35 drying ink or coating material can be used. Fast drying ink or

1 coating material can be used in an open fountain 53 (see FIGURE  
2 8); however, open air exposure causes the water and solvents in  
3 the fast-drying ink or coating material to evaporate faster, thus  
4 causing the ink or coating material to dry prematurely and change  
5 viscosity. Moreover, an open fountain emits unwanted odors into  
6 the press room. When the sealed doctor blade assembly is  
7 utilized, the pump (FIGURE 7) which circulates ink or coating  
8 material to the doctor blade head is preferably a peristaltic  
9 pump, which does not inject air into the feeder lines which supply  
10 the ink or coating reservoir 70 and helps to prevent the formation  
11 of air bubbles and foam within the ink or coating material.

12 An inking/coating apparatus 10 having an alternative  
13 applicator roller arrangement is illustrated in FIGURES 10-13. In  
14 this arrangement, the engraved metering surface of the anilox  
15 applicator rollers 66, 67 are partitioned by smooth seal surfaces  
16 66C which separates a first engraved peripheral surface portion  
17 66A from a second engraved peripheral surface portion 66B.  
18 Likewise, smooth seal surfaces 66D, 66E are formed on the opposite  
19 end portions of the applicator roller 66 for engaging end seals  
20 134, 136 (FIGURE 12) of the doctor blade reservoir. The upper  
21 applicator roller 67 has engraved anilox metering surfaces 67A and  
22 67B which are separated by a smooth seal band 67C.

23 Referring now to FIGURE 12 and FIGURE 13, the reservoir  
24 70 of the doctor blade head 68 is partitioned by a curved seal  
25 element 130 to form two separate chambers 70A, 70B. The seal  
26 element 130 is secured to the doctor blade head within an annular  
27 groove 132. The seal element 130 is preferably made of polyur-  
28 ethane foam or other durable, resilient foam material. The seal  
29 element 130 is engaged by the seal band 66, thus forming a rotary  
30 seal which blocks the leakage of ink or coating material from one  
31 reservoir chamber into the other reservoir chamber. Moreover, the  
32 seal band provides an unprinted or uncoated area which separates  
33 the printed or coated areas from each other, which is needed for  
34 work and turn printing jobs or other printing jobs which print two  
35 or more separate images onto the same substrate.

1 Another advantage of the split applicator roller  
2 embodiment is that it enables two or more flexographic inks or  
3 coating materials to be printed simultaneously within the same  
4 lithographic printing unit. That is, the reservoir chambers 70A,  
5 70B of the upper doctor blade assembly can be supplied with gold  
6 ink and silver ink, for example, while the reservoir chambers 70A,  
7 70B of the lower doctor blade assembly can be supplied with inks  
8 of two additional colors, for example opaque white ink and blue  
9 ink. This permits the opaque white ink to be overprinted with the  
10 gold ink, and the blue ink to be overprinted with the silver ink  
11 on the same printing unit on any lithographic press.

12 Moreover, a catalyst can be used in the upper doctor  
13 blade reservoir and a reactive ink or coating material can be used  
14 in the lower doctor blade reservoir. This can provide various  
15 effects, for example improved chemical resistance and higher gloss  
16 levels.

17 The split applicator roller sections 67A, 67B in the  
18 upper cradle position can be used for applying two separate inks  
19 or coating materials simultaneously, for example flexographic,  
20 aqueous and ultra-violet curable inks or coating materials, to  
21 separate surface areas of the plate, while the lower applicator  
22 roller sections 66A, 66B can apply an initiator layer and a micro-  
23 encapsulated layer simultaneously to separate blanket surface  
24 areas. Optionally, the metering surface portions 66A, 66B can be  
25 provided with different cell metering capacities for providing  
26 different printing effects which are being printed simultaneously.  
27 For example, the screen line count on one half-section of an  
28 anilox applicator roller is preferably in the range of 200-600  
29 lines per inch (79-236 lines per cm) for half-tone images, and the  
30 screen line count of the other half-section is preferably in the  
31 range of 100-300 lines per inch (39-118 lines per cm) for overall  
32 coverage, high weight applications such as opaque white. This  
33 split arrangement in combination with dual applicator rollers is  
34 particularly advantageous when used in connection with "work and  
35 turn" printing jobs.

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1 Referring again to FIGURE 8, instead of using the sealed  
2 doctor blade reservoir assembly 68 as shown in FIGURE 6, an open  
3 fountain assembly 69 is provided by the fountain pan 53 which  
4 contains a volume of liquid ink Q or coating material. The liquid  
5 ink or coating material is transferred to the applicator roller 66  
6 by a pan roller 55 which turns in contact with ink Q or coating  
7 material in the fountain pan. If a split applicator roller is  
8 used, the pan roller 55 is also split, and the pan is divided into  
9 two pan sections 53A, 53B by a separator plate 53P, as shown in  
10 FIGURE 16.

11 In the alternative embodiment of FIGURE 16, the pan  
12 roller 55 is divided into two pan roller sections 55A, 55B by a  
13 centrally located, annular groove 59. The separator plate 53P is  
14 received within and centrally aligned with the groove 59, but does  
15 not touch the adjoining roller faces. By this arrangement, two or  
16 more inks or coating materials Q1, Q2 are contained within the  
17 open pan sections 55A, 55B for transfer by the split pan roller  
18 sections 53A, 53B, respectively. This permits two or more  
19 flexographic inks or coating materials to be transferred to two  
20 separate image areas on the plate or on the blanket of the same  
21 printing unit. This arrangement is particularly advantageous for  
22 work and turn printing jobs or other printing jobs which print two  
23 or more separate images onto the same substrate.

24 The frame 60 of the inking/coating apparatus 10 includes  
25 side support members 74, 76 which support the applicator roller  
26 66, gear train 64, gear train 65, doctor blade assembly 68 and the  
27 drive motor 62. The applicator roller 66 is mounted on stub  
28 shafts 63A, 63B which are supported at opposite ends on a lower  
29 cradle assembly 100 formed by a pair of side support members 78,  
30 80 which have sockets 79, 81 and retainer caps 101, 103. The stub  
31 shafts are received in roller bearings 105, 107 which permit free  
32 rotation of the applicator roller 66 about its longitudinal axis  
33 A1 (axis A2 in the upper cradle). The retainer caps 101, 103 hold  
34 the stub shafts 63A, 63B and bearings 105, 107 in the sockets 79,

FIGURE 14

1 81 and hold the applicator roller 66 in parallel alignment with  
2 the pivot axis X.

3 The side support members 74, 76 also have an upper  
4 cradle assembly 102 formed by a pair of side support members 82,  
5 84 which are vertically spaced with respect to the lower side  
6 plates 78, 80. Each cradle 100, 102 has a pair of sockets 79, 81  
7 and 83, 85, respectively, for holding an applicator roller 66, 67  
8 for spot coating or inking engagement with the printing plate P on  
9 the plate cylinder 32 (FIGURE 4) or with a printing plate P or a  
10 blanket B on the blanket cylinder 34.

11 Preferably, the applicator roller 67 (FIGURE 8, FIGURE  
12 9) the upper cradle (plate) position is an anilox roller having a  
13 resilient transfer surface. In the dual cradle arrangement as  
14 shown in FIGURE 2, the press operator can quickly change from  
15 blanket inking/coating to plate inking/coating within minutes,  
16 since it is only necessary to release, remove and reposition or  
17 replace the applicator roller 66.

18 The capability to simultaneously print in the flexo-  
19 graphic mode, the aqueous mode, the waterless mode, or the litho-  
20 graphic mode on different printing units of the same lithographic  
21 press and to print or coat from either the plate position or the  
22 blanket position on any one of the printing units is referred to  
23 herein as the LITHOFLEX™ printing process or system. LITHOFLEX™  
24 is a trademark of Printing Research, Inc. of Dallas, Texas,  
25 U.S.A., exclusive licensee of the present invention.

26 Referring now to FIGURE 14, an inking/coating apparatus  
27 10 having an inking/coating assembly 109 of an alternative design  
28 is installed in the upper cradle position for applying ink and/or  
29 coating material to a plate P on the plate cylinder 32. According  
30 to this alternative embodiment, an applicator roller 67R having a  
31 resilient transfer surface is coupled to an anilox fluid metering  
32 roller which transfers measured amounts of printing ink or coating  
33 material to the plate P. The anilox roller 111 has a transfer  
34 surface constructed of metal, ceramic or composite material which  
35 is engraved with cells. The resilient applicator roller 67R is

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1 interposed in transfer engagement with the plate P and the  
2 metering surface of the anilox roller 111. The resilient transfer  
3 surface of the applicator roller 67R provides uniform, positive  
4 engagement with the plate.

5 Referring now to FIGURE 17, an inking/coating apparatus  
6 10 having an alternative inking/coating assembly 113 is installed  
7 in the lower cradle assembly 100 for applying flexographic or  
8 aqueous ink and/or coating material Q to a plate or blanket  
9 mounted on the blanket cylinder 34. Instead of using the sealed,  
10 dual doctor blade reservoir assembly 68 as shown in FIGURE 6, an  
11 open, single doctor blade anilox roller assembly 113 is supplied  
12 with liquid ink Q or coating material contained in an open  
13 fountain pan 117. The liquid ink or coating material Q is  
14 transferred to the engraved transfer surface of the anilox roller  
15 66 as it turns in the fountain pan 117. Excess ink or coating  
16 material Q is removed from the engraved transfer surface by a  
17 single doctor blade 68B. The liquid ink or coating material Q is  
18 pumped from an off-press source, for example the drum 73 shown in  
19 FIGURE 17, through a supply conduit 119 into the fountain pan 117  
20 by a pump 120.

21 For overall inking or coating jobs, the metering  
22 transfer surface of the anilox roller 56 extends over its entire  
23 peripheral surface. However, for certain printing jobs which  
24 print two or more separate images onto the same substrate, for  
25 example work and turn printing jobs, the metering transfer surface  
26 of the anilox applicator roller 66 is partitioned by a centrally  
27 located, annular undercut groove 66C which separates first and  
28 second metering transfer surfaces 66A, 66B as shown in FIGURE 11  
29 and FIGURE 18.

30 The single doctor blade 68B has an edge 68E which wipes  
31 simultaneously against the split metering transfer surfaces 66A,  
32 66B. In this single blade, split anilox roller embodiment 113, it  
33 is necessary to provide dual supply sources, for example drums  
34 73A, 73B, dual supply lines 119A, 119B, and dual pumps 120A, 120B.  
35 Moreover, the fountain pan 117 is also split, and the pan 117 is

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1 divided into two pan sections 117A, 117B by a separator plate 121,  
2 as shown in FIGURE 18. The separator plate 121 is centrally  
3 aligned with the undercut groove 66C, but does not touch the  
4 adjoining roller faces.

5 Although the single blade, split anilox applicator  
6 roller assembly 113 is shown mounted in the lower cradle position  
7 (FIGURE 17), it should be understood that the single blade, split  
8 anilox applicator roller assembly 113 can be mounted and used in  
9 the upper cradle position, as well.

10 According to another aspect of the present invention,  
11 the inking/coating apparatus 10 is pivotally coupled on horizontal  
12 pivot pins 88P, 90P which allows the single head, dual cradle ink-  
13 ing/coating apparatus 10 to be mounted on any lithographic  
14 printing unit. Referring to FIGURE 9, the horizontal pivot pins  
15 88P, 90P are mounted within the traditional dampener space 29 of  
16 the printing unit and are secured to the press side frames 14, 15,  
17 respectively. Preferably, the pivot support pins 88P, 90P are  
18 secured to the press side frames by a threaded fastener. The  
19 pivot support pins are received within circular openings 88, 90  
20 which intersect the side support members 74, 76 of the ink-  
21 ing/coating apparatus 10. The horizontal support pins 88P, 90P  
22 are disposed in parallel alignment with rotational axis X and with  
23 the plate cylinder and blanket cylinder, and are in longitudinal  
24 alignment with each other.

25 Preferably, the pivot pins 88P, 90P are located in the  
26 dampener space 29 so that the rotational axes A1, A2 of the  
27 applicator rollers 66, 67 are elevated with respect to the nip  
28 contact points N1, N2. By that arrangement, the transfer point  
29 between the applicator roller 66 and a blanket on the blanket  
30 cylinder 34 (as shown in FIGURE 8) and the transfer point between  
31 the applicator roller 66 and a plate on the plate cylinder 32 (as  
32 shown in FIGURE 5) are above the radius lines R1, R2 of the plate  
33 cylinder and the blanket cylinder, respectively. This permits the  
34 inking/coating apparatus 10 to move clockwise to retract the  
35 applicator roller 66 to an off-impression position relative to the





1 (off-impression) position to the operative (on-impression)  
2 position.

3 Although the dampener side installation is preferred,  
4 the inking/coating apparatus 10 can be adapted for operation on  
5 the delivery side of the printing unit, with the inking/coating  
6 apparatus being movable from a retracted (off-impression) position  
7 to an on-impression position for engagement of the applicator  
8 roller with either a plate on the plate cylinder or a blanket on  
9 the blanket cylinder on the delivery side 25 of the printing unit.

10 Movement of the inking/coating apparatus 10 to the  
11 operative (on-impression) position is produced by power actuators,  
12 preferably double acting pneumatic cylinders 104, 106 which have  
13 extendable/retractable power transfer arms 104A, 106A, respective-  
14 ly. The first pneumatic cylinder 104 is pivotally coupled to the  
15 press frame 14 by a pivot pin 108, and the second pneumatic  
16 cylinder 106 is pivotally coupled to the press frame 15 by a pivot  
17 pin 110. In response to selective actuation of the pneumatic  
18 cylinders 104, 106, the power transfer arms 104A, 106A are  
19 extended or retracted. The power transfer arm 104A is pivotally  
20 coupled to the side support member 74 by a pivot pin 112.  
21 Likewise, the power transfer arm 106A is pivotally coupled to the  
22 side support member 76 by a pivot pin 114.

23 As the power arms extend, the inking/coating apparatus  
24 10 is rotated clockwise on the pivot pins 88P, 90P, thus moving  
25 the applicator roller 66 to the off-impression position. As the  
26 power arms retract, the inking/coater apparatus 60 is rotated  
27 counterclockwise on the pivot pins 88P, 90P, thus moving the  
28 applicator roller 66 to the on-impression position. The torque  
29 applied by the pneumatic actuators is transmitted to the ink-  
30 ing/coating apparatus 10 through the pivot pin 112 and pivot pin  
31 114.

32 Fine adjustment of the on-impression position of the  
33 applicator roller relative to the plate cylinder or the blanket  
34 cylinder, and of the pressure of roller engagement, is provided by  
35 an adjustable stop assembly 115. The adjustable stop assembly 115

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1 has a threaded bolt 116 which is engagable with a bell crank 118.  
2 The bell crank 118 is pivotally coupled to the side support member  
3 74 on a pin 120. One end of the bell crank 118 is engagable by  
4 the threaded bolt 116, and a cam roller 172 is mounted for  
5 rotation on its opposite end. The striking point of engagement is  
6 adjusted by rotation of the bolt 116 so that the applicator roller  
7 66 is properly positioned for inking/coating engagement with the  
8 plate P or blanket B and provides the desired amount of ink-  
9 ing/coating pressure when the inking/coating assembly 60 is moved  
10 to the operative position.

11 This arrangement permits the in-line inking/coating  
12 apparatus to operate effectively without encroaching in the  
13 interunit space between any adjacent printing units, and without  
14 blocking or obstructing access to the cylinders of the printing  
15 units when the inking/coating apparatus is in the extended (off-  
16 impression) position or retracted (on-impression) position.  
17 Moreover, when the in-line inking/coating apparatus is in the  
18 retracted position, the doctor blade reservoir and coating  
19 circulation lines can be drained and flushed automatically while  
20 the printing press is running as well as when the press has been  
21 stopped for change-over from one job to another or from one type  
22 of ink or coating to another.

23 Substrates which are printed or coated with aqueous  
24 flexographic printing inks require high velocity hot air for  
25 drying. When printing a flexographic ink such as opaque white or  
26 metallic gold, it is always necessary to dry the printed sub-  
27 strates between printing units before overprinting them.  
28 According to the present invention, the water component on the  
29 surface of the freshly printed or coated substrate S is evaporated  
30 and dried by high velocity, hot air interunit dryer and high  
31 volume heat and moisture extractor units 124, 126 and 128, as  
32 shown in FIGURE 2, FIGURE 4 and FIGURE 5. The dryer/extractor  
33 units 124, 126 and 128 are oriented to direct high velocity heated  
34 air onto the freshly printed/coated substrates as they are  
35 transferred by the impression cylinder 36 and the intermediate

1 transfer drum 40 of one printing unit and to another transfer  
2 cylinder 30 and to the impression cylinder 36 of the next printing  
3 unit. By that arrangement, the freshly printed flexographic ink  
4 or coating material is dried before the substrate S is overprinted  
5 by the next printing unit.

6 The high velocity, hot air dryer and high performance  
7 heat and moisture extractor units 124, 126 and 128 utilize high  
8 velocity air jets which scrub and break-up the moist air layer  
9 which clings to the surface of each freshly printed or coated  
10 sheet or web. Within each dryer, high velocity air is heated as  
11 it flows across a resistance heating element within an air  
12 delivery baffle tube. High velocity jets of hot air are dis-  
13 charged through multiple airflow apertures into an exposure zone  
14 Z (FIGURE 4 and FIGURE 5) and onto the freshly printed/coated  
15 sheet S as it is transferred by the impression cylinder 36 and  
16 transfer drum 40, respectively.

17 Each dryer assembly includes a pair of air delivery  
18 dryer heads 124D, 126D and 128D which are arranged in spaced,  
19 side-by-side relationship. The high velocity, hot air dryer and  
20 high performance heat and moisture extractor units 124, 126 and  
21 128 are preferably constructed as disclosed in co-pending U.S.  
22 Patent Application Serial No. 08/132,584, filed October 6, 1993,  
23 entitled "High Velocity Hot Air Dryer", to Howard W. DeMoore, co-  
24 inventor and assignee of the present invention, and which is  
25 incorporated herein by reference, and which is marketed by  
26 Printing Research, Inc. of Dallas, Texas, U.S.A., under its  
27 trademark SUPER BLUE HV™.

28 The hot moisture-laden air displaced from the surface of  
29 each printed or coated sheet is extracted from the dryer exposure  
30 zone Z and exhausted from the printing unit by the high volume  
31 extractors 124, 126 and 128. Each extractor head includes an  
32 extractor manifold 124E, 126E and 128E coupled to the dryer heads  
33 124D, 126D and 128D and draws the moisture, volatiles, odors and  
34 hot air through a longitudinal air gap G between the dryer heads.  
35 Best results are obtained when extraction is performed simulta-

1 neously with drying. Preferably, an extractor is closely coupled  
2 to the exposure zone Z at each dryer location as shown in FIGURE  
3 4. Extractor heads 124E, 126E and 128E are mounted on the dryer  
4 heads 124D, 126D and 128D, respectively, with the longitudinal  
5 extractor air gap G facing directly into the exposure zone Z.  
6 According to this arrangement, each printed or coated sheet is  
7 dried before it is printed on the next printing unit.

8 The aqueous water-based inks used in flexographic  
9 printing evaporate at a relatively moderate temperature provided  
10 by the interunit high velocity hot air dryers/extractors 124, 126  
11 and 128. Sharpness and print quality are substantially improved  
12 since the flexographic ink or coating material is dried before it  
13 is overprinted on the next printing unit. Since the freshly  
14 printed flexographic ink is dry, dot gain is substantially reduced  
15 and back-trapping on the blanket of the next printing unit is  
16 virtually eliminated. This interunit drying/extracting arrange-  
17 ment makes it possible to print flexographic inks such as metallic  
18 ink and opaque white ink on the first printing unit, and then dry-  
19 trap and overprint on the second and subsequent printing units.

20 Moreover, this arrangement permits the first printing  
21 unit 22 to be used as a coater in which a flexographic, aqueous or  
22 UV-curable coating material is applied to the lowest grade  
23 substrate such as recycled paper, cardboard, plastic and the like,  
24 to trap and seal-in lint, dust, spray powder and other debris and  
25 provide a smoother, more durable printing surface which can be  
26 overprinted on the next printing unit.

27 A first down (primer) aqueous coating layer seals-in the  
28 surface of a low grade, rough substrate, for example, re-cycled  
29 paper or plastic, and improves overprinted dot definition and  
30 provides better ink lay-down while preventing strike-through and  
31 show-through. A flexographic UV-curable coating material can then  
32 be applied downstream over the primer coating, thus producing  
33 higher coating gloss.

34 Preferably, the applicator roller 66 is constructed of  
35 composite carbon fiber material, metal or ceramic coated metal

1 when it is used for applying ink or coating material to the  
2 blanket B or other resilient material on the blanket cylinder 14.  
3 When the applicator roller 66 is applied to the plate, it is  
4 preferably constructed as an anilox roller having a resilient,  
5 compressible transfer surface. Suitable resilient roller surface  
6 materials include Buna N synthetic rubber and EPDM (terpolymer  
7 elastomer).

8 It has been demonstrated in prototype testing that the  
9 inking/coating apparatus 10 can apply a wide range of ink and  
10 coating types, including fluorescent (Day Glo), pearlescent,  
11 metallics (gold, silver and other metals), glitter, scratch and  
12 sniff (micro-encapsulated fragrance), scratch and reveal,  
13 luminous, pressure-sensitive adhesives and the like, as well as  
14 UV-curable and aqueous coatings.

15 With the dampener assembly removed from the printing  
16 unit, the inking/coating apparatus 10 can easily be installed in  
17 the dampener space for selectively applying flexographic inks  
18 and/or coatings to a flexographic or waterless printing plate or  
19 to the blanket. Moreover, overprinting of the flexographic inks  
20 and coatings can be performed on the next printing unit since the  
21 flexographic inks and/or coatings are dried by the high velocity,  
22 hot air interunit dryer and high volume heat and moisture  
23 extractor assembly of the present invention.

24 The flexographic inks and coatings as used in the  
25 present invention contain colored pigments and/or soluble dyes,  
26 binders which fix the pigments onto the surface of the substrate,  
27 waxes, defoamers, thickeners and solvents. Aqueous printing inks  
28 predominantly contain water as a diluent and/or vehicle. The  
29 thickeners which are preferred include algonates, starch,  
30 cellulose and its derivatives, for example cellulose esters or  
31 cellulose ethers and the like. Coloring agents including organic  
32 as well as inorganic pigments may be derived from dyes which are  
33 insoluble in water and solvents. Suitable binders include  
34 acrylates and/or polyvinylchloride.

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1           When metallic inks are printed, the cells of the anilox  
2   roller must be appropriately sized to prevent the metal particles  
3   from getting stuck within the cells. For example, for metallic  
4   gold ink, the anilox roller should have a screen line count in the  
5   range of 175-300 lines per inch (68-118 lines per cm). Prefera-  
6   bly, in order to keep the anilox roller cells clear, the doctor  
7   blade assembly 68 is equipped with a bristle brush BR (FIGURE 14)  
8   as set forth in U.S. Patent 5,425,809 to Steven M. Person,  
9   assigned to Howard W. DeMoore, and licensed to Printing Research,  
10   Inc. of Dallas, Texas, U.S.A., which is incorporated herein by  
11   reference.

12           The inking/coating apparatus 10 can also apply UV-  
13   curable inks and coatings. If UV-curable inks and coatings are  
14   utilized, ultra-violet dryers/extractors are installed adjacent to  
15   the high velocity hot air dryer/extractor units 124, 126 and 128,  
16   respectively.

17           It will be appreciated that the LITHOFLEX™ printing  
18   process described herein makes it possible to selectively operate  
19   a printing unit of a press in the lithographic printing mode while  
20   simultaneously operating another printing unit of the same press  
21   in either the flexographic printing mode or in the waterless  
22   printing mode, while also providing the capability to print or  
23   coat, separately or simultaneously, from either the plate position  
24   or the blanket position. The dual cradle support arrangement of  
25   the present invention makes it possible to quickly change over  
26   from inking/coating on the blanket cylinder position to ink-  
27   ing/coating on the plate cylinder position with minimum press  
28   down-time, since it is only necessary to remove and reposition or  
29   replace the applicator roller 66 while the inking/coating  
30   apparatus 10 is in the retracted position. It is only necessary  
31   to remove four cap screws, lift the applicator roller 66 from the  
32   cradle, and reposition it in the other cradle. All of this can be  
33   accomplished in a few minutes, without removing the inking/coating  
34   apparatus 10 from the press.

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1           It is possible to spot coat or overall coat from the  
2 plate position or from the blanket position with flexographic inks  
3 or coatings on one printing unit and then spot coat or overall  
4 coat with UV-curable inks or coatings from the plate position or  
5 from the blanket position on another printing unit during the same  
6 press run. Moreover, the press operator can spot or overall coat  
7 from the plate for one job, and then spot and/or overall coat from  
8 the blanket on the next job.

9           The positioning of the applicator roller relative to the  
10 plate or blanket is repeatable to a predetermined preset operative  
11 position. Consequently, only minor printing unit modifications or  
12 alterations may be required for the LITHOFLEX™ process. Although  
13 automatic extension and retraction have been described in  
14 connection with the exemplary embodiment, extension to the  
15 operative (on-impression) position and retraction to a non-  
16 operative (off-impression) position can be carried out manually,  
17 if desired. In the manual embodiment, it is necessary to latch  
18 the inking/coating apparatus 10 to the press side frames 14, 15 in  
19 the operative (on-impression) position, and to mechanically prop  
20 the inking/coating apparatus in the off-impression (retracted)  
21 position.

22           Referring again to FIGURE 8, an applicator roller 66 is  
23 mounted on the lower cradle assembly 100 by side support members  
24 78, 80, and a second applicator roller 66 is mounted on the upper  
25 cradle assembly 102 by side support members 82, 84. According to  
26 this arrangement, the inking/coating apparatus 10 can apply  
27 printing ink and/or coating material to a plate on the plate  
28 cylinder, while simultaneously applying printing ink and/or  
29 coating material to a plate or a blanket on the blanket cylinder  
30 of the same printing unit. When the same color ink is used by the  
31 upper and lower applicator rollers from the plate position and  
32 from the blanket position simultaneously on the same printing  
33 unit, a "double bump" or double inking films or coating layers are  
34 applied to the substrate S during a single pass of the substrate  
35 through the printing unit. The tack of the two inks or coating

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1 materials must be compatible for good transfer during the double  
2 bump. Moreover, the inking/coating apparatus 10 can be used for  
3 supplying ink or coating material to the blanket cylinder of a  
4 rotary offset web press, or to the blanket of a dedicated coating  
5 unit.

6 According to conventional bronzing techniques, a  
7 metallic (bronze) powder is applied off-line to previously printed  
8 substrate which produces a grainy, textured finish or appearance.  
9 The on-line application of bronze material by conventional flexo-  
10 graphic or lithographic printing will only produce a smooth,  
11 continuous appearance. However, a grainy, textured finish is  
12 preferred for highest quality printing which, prior to the present  
13 invention, could only be produced by off-line methods.

14 Referring now to FIGURE 14 and FIGURE 15, metallic ink  
15 or coating material is applied on-line to the substrate S by  
16 simultaneous operation of the upper and lower applicator rollers  
17 67R, 66 to produce an uneven surface finish having a bronze-like  
18 textured or grainy appearance. According to the simulated  
19 bronzing method of the present invention, the flexographic bronze  
20 ink is applied simultaneously to the plate and to the blanket by  
21 the dual cradle inking/coating apparatus 10 as shown in FIGURE 14.  
22 A resilient applicator roller 67R is mounted in the upper cradle  
23 102, and an anilox applicator roller 66 is mounted on the lower  
24 cradle 100. The rollers are supplied from separate doctor blade  
25 reservoirs 70. The doctor blade reservoir 70 in the upper cradle  
26 position supplies bronze ink or coating material having relatively  
27 coarse, metallic particles 140 dispersed in aqueous or flexo-  
28 graphic ink. The coarse particle ink or coating material is  
29 applied to the plate P by the resilient applicator roller 67R in  
30 the upper cradle position 102. At the same time, flexographic  
31 and/or bronze ink or coating material having relatively fine,  
32 metallic particles 142 is transferred to the blanket B by the  
33 anilox roller 66 which is mounted on the lower cradle 100.

34 The metering surfaces of the upper and lower applicator  
35 rollers have different cell sizes and volumetric capacities which



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1 accommodate the coarse and fine metallic particles. For example,  
2 the anilox roller 111 mounted in the upper cradle position 102  
3 which transfers the coarse metallic particles 140 preferably has  
4 a screen line count in the range of 100-300 lines per inch (39-118  
5 lines per cm), and the metering surface of the anilox roller 66  
6 mounted on the lower cradle 100 which transfers the relatively  
7 fine metallic particles 142 preferably has a screen line count in  
8 the range of 200-600 lines per inch (79-236 lines per cm).

9 After transfer from the plate to the blanket, the fine  
10 metallic particles 142 form a layer over the coarse metallic  
11 particles 140. As both bronze layers are offset onto the  
12 substrate S, the layer of fine metallic particles 142 is printed  
13 onto the substrate S with the top layer of coarse metallic  
14 particles 140 providing a textured, grainy appearance. The fine  
15 metallic particles 142 cover the substrate which would otherwise  
16 be visible in the gaps between the coarse metallic particles 140.  
17 The combination of the coarse particle layer over the fine  
18 particle layer thus provides a textured, bronzed-like finish and  
19 appearance.

20 Particulate materials other than metal can be used for  
21 producing a textured finish. For example, coarse and fine  
22 particles of metallized plastic (glitter), mica particles  
23 (pearlescent) and the like, can be substituted for the metallic  
24 particles for producing unlimited surface variations, appearances  
25 and effects. All of the particulate material, including the  
26 metallic particles, are preferably in solid, flat platelet form,  
27 and have a size dimension suitable for application by an anilox  
28 applicator roller. Other particulate or granular material, for  
29 example stone grit having irregular form and size, can be used to  
30 good advantage.

31 Solid metal particles in platelet form, which are good  
32 reflectors of light, are preferred for producing the bronzed-like  
33 appearance and effect. However, various textured finishes, which  
34 could have light-reflective properties, can be produced by using  
35 granular materials such as stone grit. Most commonly used metals

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1 include copper, zinc and aluminum. Other ductile metals can be  
2 used, if desired. Moreover, the coarse and fine particles need  
3 not be made of the same particulate material. Various effects and  
4 textured appearances can be produced by utilizing diverse  
5 particulate materials for the coarse particles and the fine  
6 particles, respectively. Further, either fine or coarse particle  
7 ink or coating material can be printed from the upper cradle  
8 position, and either fine or coarse particle ink or coating  
9 material can be printed from the lower cradle position, depending  
10 on the special or surface finish that is desired.

11 It will be appreciated that the last printing unit 28  
12 can be configured for additional inking/coating capabilities which  
13 include lithographic, waterless, aqueous and flexographic  
14 processes. Various substrate surface effects (for example double  
15 bump or triple bump inking/coating or bronzing) can be performed  
16 on the last printing unit. For triple bump inking/coating, the  
17 last printing unit 28 is equipped with an auxiliary in-line inking  
18 or coating apparatus 97 as shown in FIGURE 3 and FIGURE 4. The  
19 in-line inking or coating apparatus 97 allows the application of  
20 yet another film of ink or a protective or decorative layer of  
21 coating material over any freshly printed or coated surface  
22 effects or special treatments, thereby producing a triple bump.  
23 The triple bump is achieved by applying a third film of ink or  
24 layer of coating material over the freshly printed or coated  
25 double bump simultaneously while the substrate is on the impres-  
26 sion cylinder of the last printing unit.

27 When the in-line inking/coating apparatus 97 is  
28 installed, it is necessary to remove the SUPER BLUE® flexible  
29 covering from the delivery cylinder 42, and it is also necessary  
30 to modify or convert the delivery cylinder 42 for inking/coating  
31 service by mounting a plate or blanket B on the delivery cylinder  
32 42, as shown in FIGURE 3 and FIGURE 4. Packing material is placed  
33 under the plate or blanket B, thereby packing the plate or blanket  
34 B at the correct packed-to-print radial clearance so that ink or  
35 coating material will be printed or coated onto the freshly

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1 printed substrate S as it transfers through the nip between the  
2 plate or blanket B on the converted delivery cylinder 42 and the  
3 last impression cylinder 36. According to this arrangement, a  
4 freshly printed or coated substrate is overprinted or overcoated  
5 with a third film or layer of ink or coating material simulta-  
6 neously while a second film or layer of ink or coating material is  
7 being over-printed or over-coated on the last impression cylinder  
8 36.

9 The auxiliary inking/coating apparatus 97 and the  
10 converted or modified delivery cylinder 42 are mounted on the  
11 delivery drive shaft 43. The inking/coating apparatus 97 includes  
12 an applicator roller, preferably an anilox applicator roller 97A,  
13 for supplying ink or coating material to a plate or blanket B on  
14 the modified or converted delivery cylinder 42. The in-line  
15 inking/coating apparatus 97 and the modified or converted delivery  
16 cylinder 42 are preferably constructed as described in U.S. Patent  
17 5,176,077 to Howard W. DeMoore (co-inventor and assignee), which  
18 is hereby incorporated by reference. The in-line inking/coating  
19 apparatus 97 is manufactured and sold by Printing Research, Inc.  
20 of Dallas, Texas, U.S.A., under its trademark SUPER BLUE EZ  
21 COATER™.

22 After the delivery cylinder 42 has been modified or  
23 converted for inking/coating service, and because of the reduced  
24 nip clearance imposed by the plate or blanket B, the modified  
25 delivery cylinder 42 can no longer perform its original function  
26 of guiding and transferring the freshly printed or coated  
27 substrate. Instead, the modified or converted delivery cylinder  
28 42 functions as a part of the inking/coating apparatus 97 by  
29 printing or coating a third down film of ink or layer of coating  
30 material onto the freshly printed or coated substrate as it is  
31 simultaneously printed or coated on the last impression cylinder  
32 36. Moreover, the mutual tack between the second down ink film or  
33 coating layer and the third down ink film or coating layer causes  
34 the overprinted or overcoated substrate to cling to the plate or

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1 blanket, thus opposing or resisting separation of the substrate  
2 from the plate or blanket.

3 To remedy this problem, a vacuum-assisted transfer  
4 apparatus 99 is mounted adjacent the modified or converted  
5 delivery cylinder 42 as shown in FIGURE 3 and FIGURE 4. Another  
6 purpose of the vacuum-assisted transfer apparatus 99 is to  
7 separate the freshly overprinted or overcoated triple bump  
8 substrate from the plate or blanket B as the substrate transfers  
9 through the nip. The vacuum-assisted transfer apparatus 99  
10 produces a pressure differential across the freshly overprinted or  
11 overcoated substrate as it transfers through the nip, thus  
12 producing a separation force onto the substrate and providing a  
13 clean separation from the plate or blanket B.

14 The vacuum-assisted transfer apparatus 99 is preferably  
15 constructed as described in U.S. Patent Nos. 5,113,255; 5,127,329;  
16 5,205,217; 5,228,391; 5,243,909; and 5,419,254, all to Howard W.  
17 DeMoore, co-inventor, which are incorporated herein by reference.  
18 The vacuum-assisted transfer apparatus 99 is manufactured and sold  
19 by Printing Research, Inc. of Dallas, Texas, U.S.A. under its  
20 trademark BACVAC™.

21 Although the present invention and its advantages have  
22 been described in detail, it should be understood that various  
23 changes, substitutions and alterations can be made herein without  
24 departing from the spirit and scope of the present invention as  
25 defined by the appended claims.

What is claimed is:

1           1. In a printing press of the type having first and  
2 second side frame members forming a printing unit on which a plate  
3 cylinder, a blanket cylinder and an impression cylinder are  
4 supported for rotation, the improvement comprising:

5           inking/coating apparatus movably coupled to the  
6 printing unit for movement to an on-impression operative position  
7 and to an off-impression retracted position; and,

8           the inking/coating apparatus including means for  
9 applying ink or coating material to a plate mounted on the plate  
10 cylinder, or to a plate or blanket mounted on the blanket  
11 cylinder, either separately or simultaneously when the ink-  
12 ing/coating apparatus is in the operative position.

1           2. The invention as set forth in claim 1, wherein the  
2 inking/coating apparatus comprises:

3           a doctor blade assembly having a reservoir for  
4 receiving ink or coating material;

5           an applicator roller coupled to the doctor blade  
6 assembly in fluid communication with the reservoir, the applicator  
7 roller being engagable with a printing plate on the plate cylinder  
8 or with a blanket on the blanket cylinder when the inking/coating  
9 apparatus is in the operative position.

1           3. The invention as set forth in claim 2, the  
2 applicator roller comprising:

3           an anilox roller having a resilient transfer  
4 surface.

1           4. The invention as set forth in claim 1, including:  
2 first and second pivot pins mounted on the first  
3 and second side frame members, respectively, said pivot pins  
4 extending in alignment with the rotational axis of the plate and  
5 blanket cylinders; and

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6 the inking/coating apparatus being pivotally  
7 coupled for rotational movement on the pivot pins.

1 5. The invention as set forth in claim 1, further  
2 comprising:

3 a power actuator pivotally coupled to the printing  
4 unit, the power actuator having a power transfer arm which is  
5 extendable and retractable; and,

6 apparatus coupled to the power transfer arm and to  
7 the inking/coating apparatus for converting extension or retrac-  
8 tion movement of the power transfer arm into pivotal movement of  
9 the inking/coating apparatus relative to the plate and blanket  
10 cylinders.

1 6. The invention as set forth in claim 5, in which the  
2 movement converting apparatus comprises:

3 a bell crank plate having a first end portion  
4 pivotally coupled to the inking/coating apparatus for engaging the  
5 printing unit and having a second end portion for engaging a stop  
6 member; and,

7 a stop member coupled to the inking/coating  
8 apparatus for engaging the second end portion of the bell crank  
9 plate.

1 7. The invention as set forth in claim 1, the  
2 inking/coating apparatus comprising:

3 an applicator head having first and second side  
4 support members;

5 the ink or coating applying means being mounted  
6 between the first side support member and second side support  
7 member and having a reservoir or fountain pan for receiving ink or  
8 coating material;

9 cradle means mounted on the first and second side  
10 support members, respectively;

11 applicator roller means including at least one  
12 applicator roller mounted for rotation on the cradle means and  
13 disposed for rolling contact with ink or coating material in the  
14 reservoir or fountain pan, the applicator roller being engagable  
15 with a printing plate on the plate cylinder or with a blanket on  
16 the blanket cylinder in the operative position; and,  
17 power transfer means coupled to the applicator  
18 roller means for rotating the at least one applicator roller.

1 8. The invention as set forth in claim 7,  
2 the at least one cradle means including first and  
3 second cradles disposed on the first and second side support  
4 members respectively; and,  
5 the applicator roller being mounted for rotation on  
6 one of the first and second cradles.

1 9. The invention as set forth in claim 7,  
2 the cradle means including a first cradle assembly  
3 disposed on the first and second side support members, respective-  
4 ly, and a second cradle assembly disposed on the first and second  
5 side support members, respectively;  
6 the applicator roller means including a first  
7 applicator roller mounted for rotation on the first cradle  
8 assembly for applying ink or coating material to a plate mounted  
9 on the plate cylinder when the inking/coating apparatus is in the  
10 operative position; and,  
11 the applicator roller means including a second  
12 applicator roller mounted for rotation on the second cradle  
13 assembly for applying ink or coating material to a plate or a  
14 blanket mounted on the blanket cylinder when the inking/coating  
15 apparatus is in the operative position.

1 10. The invention as set forth in claim 1, wherein the  
2 printing unit having a dampener space, and the inking/coating  
3 apparatus being disposed within the dampener space.

1 11. A printing press comprising, in combination:  
2 a printing unit;  
3 at least one cylinder mounted for rotation in the  
4 printing unit for printing ink or coating material onto a  
5 substrate transferring through said printing unit;  
6 inking/coating apparatus having container means for  
7 containing liquid ink or coating material, a rotatable applicator  
8 roller and means for applying liquid ink or coating material from  
9 the container means to a peripheral surface portion of the  
10 applicator roller; and,  
11 support means mounted on the printing unit, said  
12 inking/coating apparatus being movably coupled to the support  
13 means for movement to an operative on-impression position in which  
14 the applicator roller is engagable with a plate or a blanket  
15 mounted on said at least one cylinder, and for movement to an off-  
16 impression position in which the inking/coating apparatus is  
17 retracted away from said at least one cylinder.

1 12. A printing press as defined in claim 11, wherein  
2 the container means comprises a doctor blade assembly having a  
3 reservoir or fountain pan for supplying ink or coating material to  
4 the applicator roller, and having a doctor blade disposed for  
5 wiping engagement with the applicator roller when it is received  
6 in rolling contact with ink or coating material in the reservoir  
7 or pan.

1 13. A printing press as defined in claim 11, wherein  
2 the container means comprises a fountain pan and the inking  
3 applying means comprises a pan roller for transferring ink or  
4 coating material from the fountain pan to the applicator roller.

1 14. A printing unit of the type having a delivery side  
2 and a dampener side comprising, in combination:



3 a plate cylinder mounted on the printing unit  
4 between the delivery side and the dampener side, and a printing  
5 plate mounted on the plate cylinder;

6 a blanket cylinder having an ink or coating  
7 receptive blanket disposed in ink or coating transfer engagement  
8 with the plate for transferring ink or coating material from the  
9 image surface areas of the printing plate to the ink or coating  
10 receptive blanket;

11 an impression cylinder disposed adjacent the  
12 blanket cylinder thereby forming a nip between the blanket and the  
13 impression cylinder whereby the printing ink or coating material  
14 is transferred from the blanket to a substrate as the substrate is  
15 transferred through the nip;

16 support means mounted on the dampener side of the  
17 printing unit; and,

18 inking/coating apparatus for applying ink or  
19 coating material to the plate or to the blanket, the inking/  
20 coating apparatus being movably coupled to the support means for  
21 movement to an operative, on-impression position in which the  
22 inking/coating apparatus is engagable with the plate or the  
23 blanket, and for movement to an off-impression position in which  
24 the inking/coating apparatus is retracted and disengaged from the  
25 plate and blanket.

1 15. The invention as defined in claim 14, including:

2 a dryer mounted on the printing unit for discharg-  
3 ing heated air onto a freshly printed or coated substrate before  
4 the freshly printed or coated substrate is subsequently printed,  
5 coated or otherwise processed.

1 16. The invention as defined in claim 14, wherein:

2 the dryer is mounted adjacent to the impression  
3 cylinder for discharging heated air onto a freshly printed or  
4 coated substrate while the substrate is in contact with the  
5 impression cylinder.

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1           17. The invention as defined in claim 14, comprising:  
2           an extractor coupled to the dryer for extracting  
3 hot air, moisture, odors and volatiles from an exposure zone  
4 between the dryer and the freshly printed or coated substrate.

1           18. The invention as defined in claim 14, comprising:  
2           a transfer cylinder disposed in an interunit  
3 position on the press and coupled in sheet transfer relation with  
4 the impression cylinder; and,  
5           an interunit dryer disposed adjacent the transfer  
6 cylinder for discharging heated air onto a freshly printed or  
7 coated substrate after it has been transferred from the impression  
8 cylinder and while it is in contact with the transfer cylinder.

1           19. A printing press as defined in claim 14, further  
2 including:

3           a transfer drum coupled in substrate transfer  
4 relation with the impression cylinder of a first printing unit and  
5 in substrate transfer relation with the impression cylinder of a  
6 second printing unit;

7           a first dryer mounted adjacent the impression  
8 cylinder of the first printing unit for discharging heated air  
9 onto a freshly printed or coated substrate while the substrate is  
10 in contact with the impression cylinder of the first printing  
11 unit;

12           a second dryer mounted adjacent the transfer drum  
13 for discharging heated air onto a freshly printed or coated  
14 substrate after it has been transferred from the impression  
15 cylinder of the first printing unit and while it is in contact  
16 with the transfer cylinder; and,

17           a third dryer disposed adjacent the impression  
18 cylinder of the second printing unit for discharging heated air  
19 onto a freshly printed or coated substrate after it has been  
20 transferred from the transfer drum and while it is in contact with  
21 the impression cylinder of the second printing unit.

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1           20. In a printing press of the type having first and  
2 second side frame members providing support for a printing unit in  
3 which a blanket cylinder is disposed between the delivery side and  
4 the dampener side of the printing unit, the improvement compris-  
5 ing:

6           support means mounted on the side frame members on  
7 the dampener side of the printing unit;

8           inking/coating apparatus for applying ink or  
9 coating material to a blanket mounted on the blanket cylinder when  
10 the inking/coating apparatus is in the operative on-impression  
11 position; and,

12           the inking/coating apparatus being pivotally  
13 coupled to the support means for movement to the operative  
14 position in which the inking/coating apparatus is supported  
15 laterally adjacent to the blanket cylinder, and to an off-  
16 impression position in which the inking/coating apparatus is  
17 retracted away from the blanket cylinder.

1           21. The invention as set forth in claim 20, wherein the  
2 printing unit includes a plate cylinder and a plate mounted on the  
3 plate cylinder, the inking/coating apparatus including:

4           first cradle means for supporting an applicator  
5 roller for engagement with the plate when the inking/coating  
6 apparatus is in the operative position; and,

7           second cradle means for supporting an applicator  
8 roller for engagement with the blanket when the inking/coating  
9 apparatus is in the operative position.

1           22. The invention as set forth in claim 20, said  
2 support means comprising:

3           first and second pivot means mounted on the first  
4 and second side frame members, respectively.

1           23. The invention as set forth in claim 20, further  
2 comprising:

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3 a power actuator pivotally coupled to the ink-  
4 ing/coating apparatus, the power actuator having a power transfer  
5 arm which is selectively extendable or retractable; and,  
6 apparatus coupled to the power transfer arm and to  
7 the inking/coating apparatus for converting extension or retrac-  
8 tion movement of the power transfer arm into pivotal movement of  
9 the inking/coating apparatus relative to the printing unit.

1 24. The invention as set forth in claim 20, further  
2 comprising:

3 a bell crank plate having a first end portion  
4 coupled to the inking/coating apparatus and having a second end  
5 portion for engaging a stop member; and,

6 a stop member secured to the inking/coating  
7 apparatus for engaging the second end portion of the bell crank  
8 plate.

1 25. The invention as set forth in claim 1, wherein the  
2 inking/coating apparatus comprises:

3 an applicator roller having a resilient transfer  
4 surface.

1 26. The invention as set forth in claim 25, wherein the  
2 applicator roller is supported for engagement with a plate on the  
3 plate cylinder in the operative position, the applicator roller  
4 comprising an anilox roller having a resilient transfer surface.

1 27. A printing press as defined in any one of claims 1,  
2 11, 14 or 20, including:

3 a supply container for containing a volume of  
4 liquid ink or coating material;

5 circulation means coupled between the supply  
6 reservoir and the inking/coating apparatus for inducing the flow  
7 of liquid ink or coating material from said supply container to  
8 the inking/coating apparatus and for returning liquid ink or

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9 coating material from the inking/coating apparatus to the supply  
10 container; and,

11 heat exchanger means coupled to the circulation  
12 means for maintaining the temperature of the liquid ink or coating  
13 material within a predetermined temperature range.

1 28. A printing press as set forth in any one of the  
2 claims 1, 11, 14 or 20, wherein the inking/coating apparatus  
3 comprises:

4 a fountain pan for containing a volume of liquid  
5 ink or coating material;

6 an applicator roller having a metering surface;  
7 and,

8 a pan roller mounted for rotation in the fountain  
9 pan and coupled to the applicator roller for transferring ink or  
10 coating material from the fountain pan to the applicator roller.

1 29. A printing press as defined in any one of claims 1,  
2 11, 14 or 20, characterized in that:

3 a resilient packing is mounted on the blanket  
4 cylinder, and a printing plate is mounted on the resilient  
5 packing.

1 30. A printing press as defined in any one of claims 1,  
2 11, 14 or 20, wherein the means for applying ink or coating  
3 material comprises:

4 first cradle means;

5 a first reservoir or fountain means mounted on the  
6 first cradle means for containing ink or coating material;

7 a first applicator roller mounted for rotation on  
8 the first cradle means and disposed for rolling contact with ink  
9 or coating material in the first reservoir or fountain means, the  
10 first applicator roller being engagable with a printing plate on  
11 the plate cylinder;

12 second cradle means;

13 a second reservoir or fountain means mounted on the  
14 second cradle means for receiving ink or coating material;  
15 a second applicator roller mounted for rotation on  
16 the second cradle means and disposed for rolling contact with ink  
17 or coating material in the second reservoir or fountain means, the  
18 second applicator roller being engagable with a plate or blanket  
19 mounted on the blanket cylinder in the operative position.

1 31. A printing press as defined in any one of claims 1,  
2 11, 14 or 20, wherein the means for applying ink or coating  
3 material comprises an applicator roller, and the inking/coating  
4 apparatus is pivotally mounted on the printing unit in a position  
5 in which the nip contact point between the applicator roller and  
6 a blanket or plate is offset with respect to a radius line  
7 projecting through the center of the plate cylinder or blanket  
8 cylinder to the axis of rotation of the printing/coating unit.

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"RETRACTABLE PRINTING/COATING UNIT OPERABLE ON THE PLATE  
AND BLANKET CYLINDERS SIMULTANEOUSLY FROM THE DAMPENER  
SIDE OF THE FIRST PRINTING UNIT OR ANY CONSECUTIVE  
PRINTING UNIT OF ANY ROTARY OFFSET PRINTING PRESS"

Abstract of the Disclosure

1 A retractable in-line inking/coating apparatus can apply  
2 either spot or overall inking/coating material to a plate and/or  
3 a blanket on the first printing unit or on any consecutive  
4 printing unit of any rotary offset printing press. The ink-  
5 ing/coating apparatus is pivotally mounted within the conventional  
6 dampener space of any lithographic printing unit. The aqueous  
7 component of the flexographic printing ink or aqueous coating  
8 material is evaporated and dried by high velocity, hot air dryers  
9 and high performance heat and moisture extractors so that the  
10 aqueous or flexographic ink or coating material on a freshly  
11 printed or coated sheet is dry and can be dry-trapped on the next  
12 printing unit. The inking/coating apparatus includes dual cradles  
13 that support first and second applicator rollers so that the ink-  
14 ing/coating apparatus can apply a double bump of aque-  
15 ous/flexographic or UV-curable printing ink or coating material to  
16 a plate on the plate cylinder, while simultaneously applying  
17 aqueous, flexographic or UV-curable printing ink or coating  
18 material to a plate or a blanket on the blanket cylinder, and  
19 thereafter onto a sheet as the sheet is transferred through the  
20 nip between the blanket cylinder and the impression cylinder. A  
21 triple bump is printed or coated on the last printing unit with  
22 the aid of an impression cylinder inking/coating unit.

\* \* \* \* \*

DTG: 19750181DOCS08038AAPP



Attorney Docket No.

B6038A

SMALL ENTITY  
INDEPENDENT INVENTOR

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

DECLARATION CLAIMING SMALL ENTITY STATUS  
(37 C.F.R. §1.9(f) and §1.27 (b)) - INDEPENDENT INVENTOR

I, JOHN W. BIRD, hereby declare that I qualify as an independent inventor as defined in 37 C.F.R. §1.9(c) for the purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the U.S. Patent and Trademark Office with regard to the invention entitled

"RETRACTABLE PRINTING/COATING UNIT OPERABLE ON THE PLATE AND BLANKET CYLINDERS SIMULTANEOUSLY FROM THE DAMPFNER SIDE OF THE FIRST PRINTING UNIT OR ANY CONSECUTIVE PRINTING UNIT OF ANY ROTARY OFFSET PRINTING PRESS",

X in the application filed herewith.

\_\_\_\_\_ in U.S. application Serial No. \_\_\_\_\_ filed \_\_\_\_\_.

\_\_\_\_\_ patent No. \_\_\_\_\_, issued \_\_\_\_\_.

I have not assigned, granted, conveyed or licensed, and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 C.F.R. §1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 C.F.R. §1.9(d) or a non-profit organization under 37 C.F.R. §1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under any obligation under contract or law to assign, grant, convey, or license any rights in the invention is identified below:

\_\_\_\_\_ no such person, concern or organization exists.



X any such person, concern or organization is identified below, if applicable:

Full Name Howard W. DeMoore

Address 10954 Shady Trail

Dallas, Texas 75220

X individual      small business concern

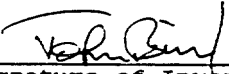
     nonprofit organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate pursuant to 37 C.F.R. §1.28(b).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Printed Name of Inventor: John W. Bird

Date: 9.11.95

  
Signature of Inventor

DTG11976W181DOCS24038 SE2



Attorney Docket No.

B6038A

SMALL ENTITY  
INDEPENDENT INVENTOR

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

DECLARATION CLAIMING SMALL ENTITY STATUS  
(37 C.F.R. §1.9(f) and §1.27 (b)) - INDEPENDENT INVENTOR

I, RONALD M. RENDLEMAN, hereby declare that I qualify as an independent inventor as defined in 37 C.F.R. §1.9(c) for the purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the U.S. Patent and Trademark Office with regard to the invention entitled

"RETRACTABLE PRINTING/COATING UNIT OPERABLE ON THE PLATE AND BLANKET CYLINDERS SIMULTANEOUSLY FROM THE DAMPENER SIDE OF THE FIRST PRINTING UNIT OR ANY CONSECUTIVE PRINTING UNIT OF ANY ROTARY OFFSET PRINTING PRESS",

X in the application filed herewith.

\_\_\_\_\_ in U.S. application Serial No. \_\_\_\_\_ filed \_\_\_\_\_.

\_\_\_\_\_ patent No. \_\_\_\_\_, issued \_\_\_\_\_.

I have not assigned, granted, conveyed or licensed, and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 C.F.R. §1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 C.F.R. §1.9(d) or a non-profit organization under 37 C.F.R. §1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under any obligation under contract or law to assign, grant, convey, or license any rights in the invention is identified below:

\_\_\_\_\_ no such person, concern or organization exists.

Y any such person, concern or organization is identified below, if applicable:

Full Name Howard DeMoore

Address 1035 Trail

Dallas, Texas 75220

X individual        small business concern  
       nonprofit organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate pursuant to 37 C.F.R. §1.28(b).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Printed Name of Inventor: Ronald M. Rendleman

Date: 9-11-95 Ronald M. Rendleman  
Signature of Inventor

003157796-061201



Attorney Docket No.

B6038A

SMALL ENTITY  
INDEPENDENT INVENTOR

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

DECLARATION CLAIMING SMALL ENTITY STATUS  
(37 C.F.R. §1.9(f) and §1.27 (b)) - INDEPENDENT INVENTOR

I, HOWARD W. DEMOORE, hereby declare that I qualify as an independent inventor as defined in 37 C.F.R. §1.9(c) for the purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the U.S. Patent and Trademark Office with regard to the invention entitled

"RETRACTABLE PRINTING/COATING UNIT OPERABLE ON THE PLATE AND BLANKET CYLINDERS SIMULTANEOUSLY FROM THE DAMPENER SIDE OF THE FIRST PRINTING UNIT OR ANY CONSECUTIVE PRINTING UNIT OF ANY ROTARY OFFSET PRINTING PRESS",

X in the application filed herewith.

\_\_\_\_\_ in U.S. application Serial No. \_\_\_\_\_ filed \_\_\_\_\_.

\_\_\_\_\_ patent No. \_\_\_\_\_, issued \_\_\_\_\_.

I have not assigned, granted, conveyed or licensed, and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 C.F.R. §1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 C.F.R. §1.9(d) or a non-profit organization under 37 C.F.R. §1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under any obligation under contract or law to assign, grant, convey, or license any rights in the invention is identified below:

\_\_\_\_\_ no such person, concern or organization exists.

X any such person, concern or organization is identified below, if applicable:

Full Name Printing Research, Inc.

Address 10954 Shady Trail

Dallas, Texas 75220

     individual   X   small business concern  
     nonprofit organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate pursuant to 37 C.F.R. §1.28(b).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Printed Name of Inventor: Howard W. DeMoore

Date: 9/11/95

Howard W. DeMoore  
Signature of Inventor

DTJ111876W181DOCS#8038.563

PATENT

JOINT  
UTILITY

Attorney Docket  
No. B6038A

DECLARATION AND POWER OF ATTORNEY

We, HOWARD W. DEMOORE, RONALD M. RENDLEMAN and JOHN W. BIRD, joint inventors herein, hereby declare that:

Our residence, post office address and citizenship are as stated below next to our names.

We believe that we are the original, first and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled

"RETRACTABLE PRINTING/COATING UNIT OPERABLE ON THE PLATE AND BLANKET CYLINDERS SIMULTANEOUSLY FROM THE DAMPENER SIDE OF THE FIRST PRINTING UNIT OR ANY CONSECUTIVE PRINTING UNIT OF ANY ROTARY OFFSET PRINTING PRESS",

the specification of which is attached hereto.

We hereby state that we have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to in this declaration.

We each individually acknowledge the duty to disclose to the U.S. Patent Office all information known to me that is material to the patentability of any claim in accordance with Title 37, Code of Federal Regulations, §1.56, and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent.

We hereby claim foreign priority benefits under Title 35, United States Code §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Country

Application No.

Filing Date  
(day, month, year)

- NONE -

We hereby claim the benefit under Title 35, United States Code §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code §112, we acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<u>U.S. Serial No.</u>	<u>U.S. Filing Date</u>	<u>Status</u>
08/435,798	May 4, 1995	Pending

A We hereby appoint DENNIS T. GRIGGS, Registration No. 27,790, of the firm of AKIN, GUMP, STRAUSS, HAUER & FELD, L.L.P., our attorney to prosecute this application and to transact all business in the U.S. Patent and Trademark Office connected therewith. We request that all correspondence be addressed to:

Dennis T. Griggs  
Akin, Gump, Strauss, Hauer & Feld, L.L.P.  
1700 Pacific Avenue, Suite 4100  
Dallas, Texas 75201-4618

Phone: 214/969-2747

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issued thereon.

100 Full name of first joint Inventor: Howard W. DeMoore  
Residence: Dallas, Texas  
Citizenship: U.S.  
Post Office Address: 10954 Shady Trail  
Dallas, Texas 75220

Date: 9/11/95

Howard W. DeMoore  
Howard W. DeMoore

2<sup>nd</sup>

Full name of  
second joint Inventor: Ronald M. Rendleman

Residence: Dallas, Texas TX

Citizenship: U.S.

Post Office Address: 4331 Royal Ridge  
Dallas, Texas 75229

Date: 9-11-95

Ronald M. Rendleman  
Ronald M. Rendleman

3<sup>rd</sup>

Full name of  
third joint Inventor: John W. Bird

Residence: Carrollton, Texas TX

Citizenship: United Kingdom

Post Office Address: 1514 Iroquois Circle  
Carrollton, Texas 75007

Date: 9-11-95

John W. Bird  
John W. Bird

09345705 051301





Attorney Docket No.

B6038A

SMALL ENTITY  
SMALL BUSINESS CONCERN

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL  
ENTITY STATUS (37 C.F.R. §1.9(f) and §1.27(c))--  
SMALL BUSINESS CONCERN

I, HOWARD W. DEMOORE

hereby declare that I am

— the owner of the small business concern identified below:

X an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN Printing Research, Inc.

ADDRESS OF CONCERN 10954 Shady Trail

Dallas, Texas 75220

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 37 C.F.R. §121.3-18, and reproduced in 37 C.F.R. §1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when, either directly or indirectly, one concern controls or has the power to control the other, or a third-party or parties controls or has the power to control both.

I hereby declare that rights under license, contract or law have been acquired by or conveyed to and remain with the small business concern identified above with regard to the invention entitled

00345795-051201

"RETRACTABLE PRINTING/COATING UNIT OPERABLE ON THE  
PLATE AND BLANKET CYLINDERS SIMULTANEOUSLY FROM THE  
DAMPENER SIDE OF THE FIRST PRINTING UNIT OR ANY CONSECU-  
TIVE PRINTING UNIT OF ANY ROTARY OFFSET PRINTING PRESS",

by inventors Howard W. DeMoore, Ronald M. Rendleman and John W.  
Bird

as described in

- ☒ the specification filed herewith.  
☐ the specification filed \_\_\_\_\_ under Serial  
No. \_\_\_\_\_  
☐ Patent No. \_\_\_\_\_, issued \_\_\_\_\_

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 C.F.R. §1.9(d) or by any concern which would not qualify as a small business concern under 37 C.F.R. §1.9(d) or a nonprofit organization under 37 C.F.R. §1.9(e).

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TYPED NAME OF PERSON SIGNING Howard W. DeMoore

TITLE OF PERSON OTHER THAN OWNER President and Chairman of  
the Board

Date: 9/11/95

Howard W DeMoore  
Signature

DTG1119750181DOC388038.V8

09345706 0543201  
102750 90751560

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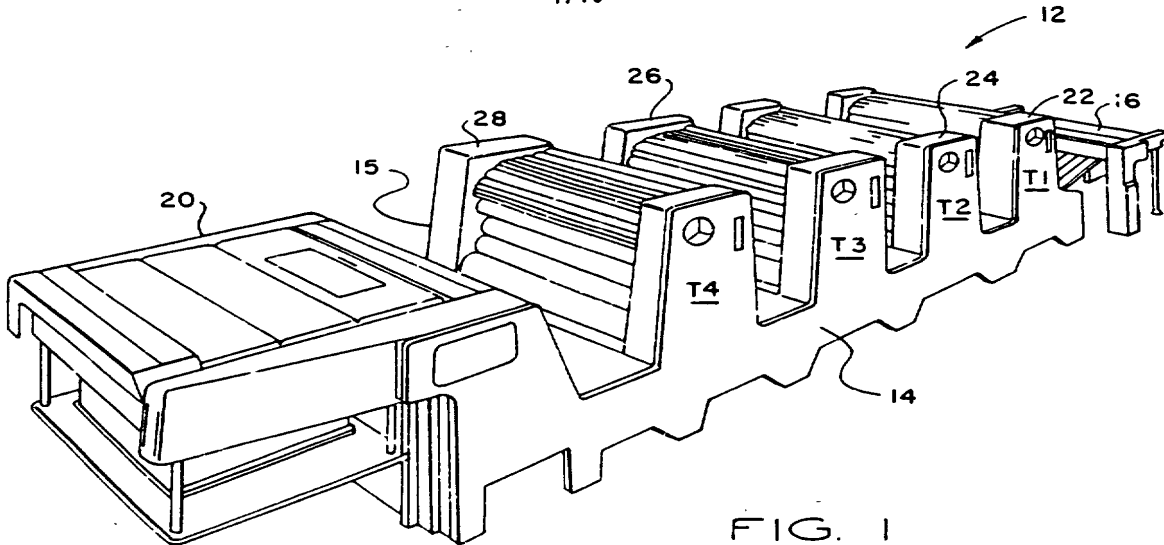


FIG. 1

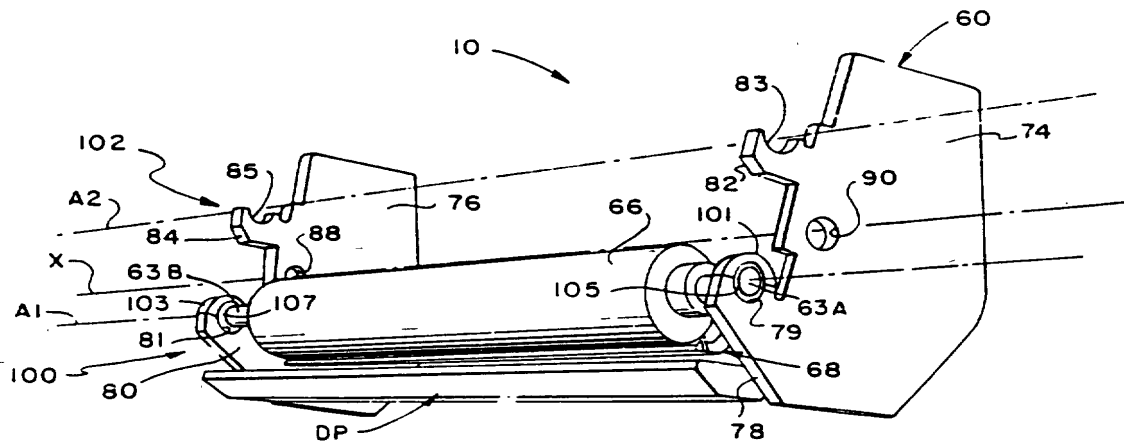


FIG. 2

FIG. 3

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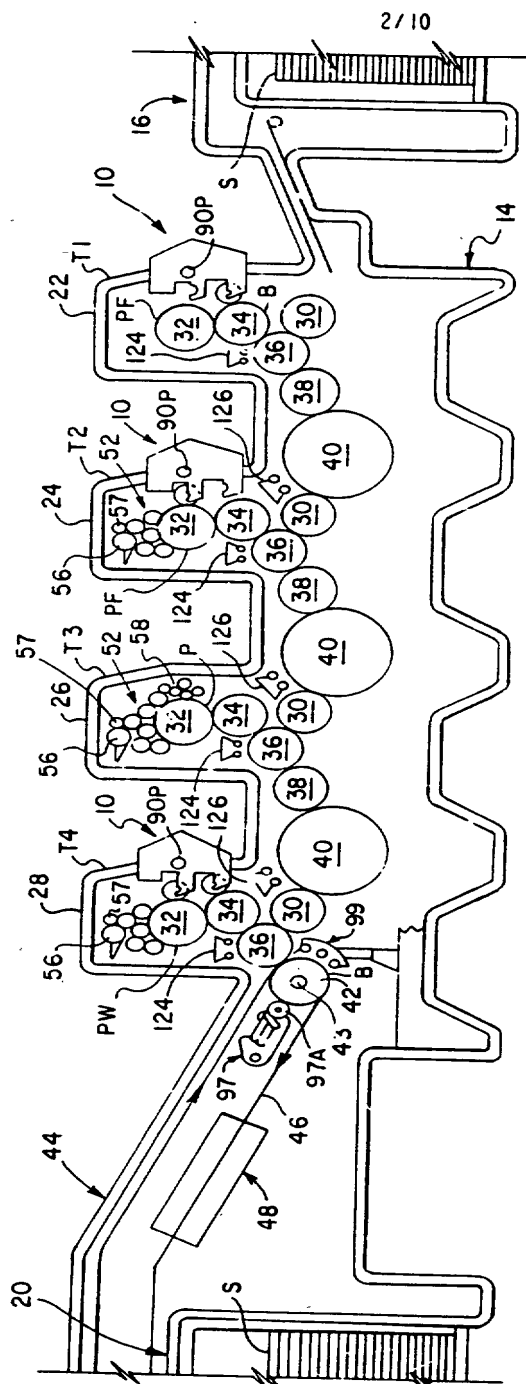


FIG. 3

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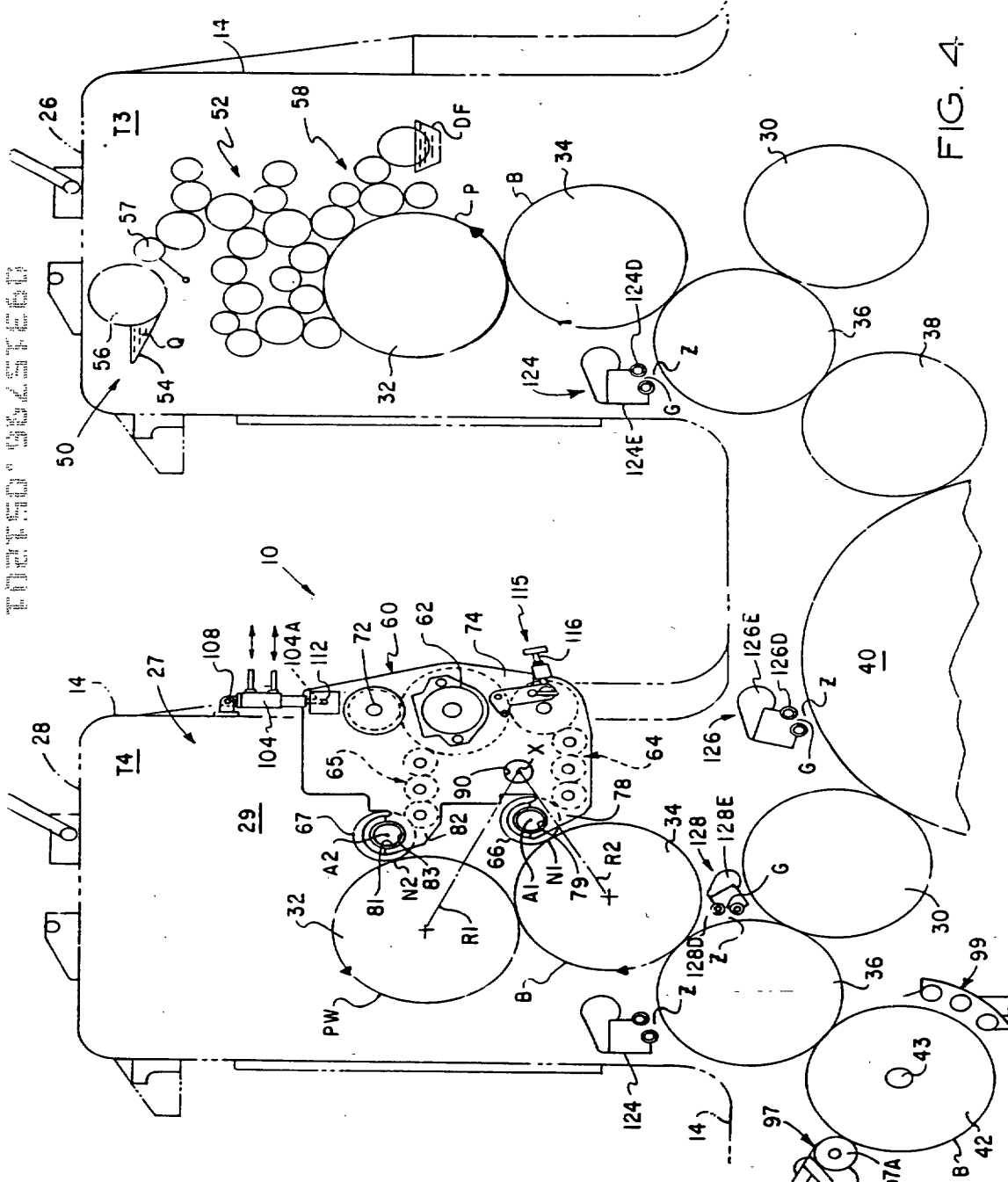
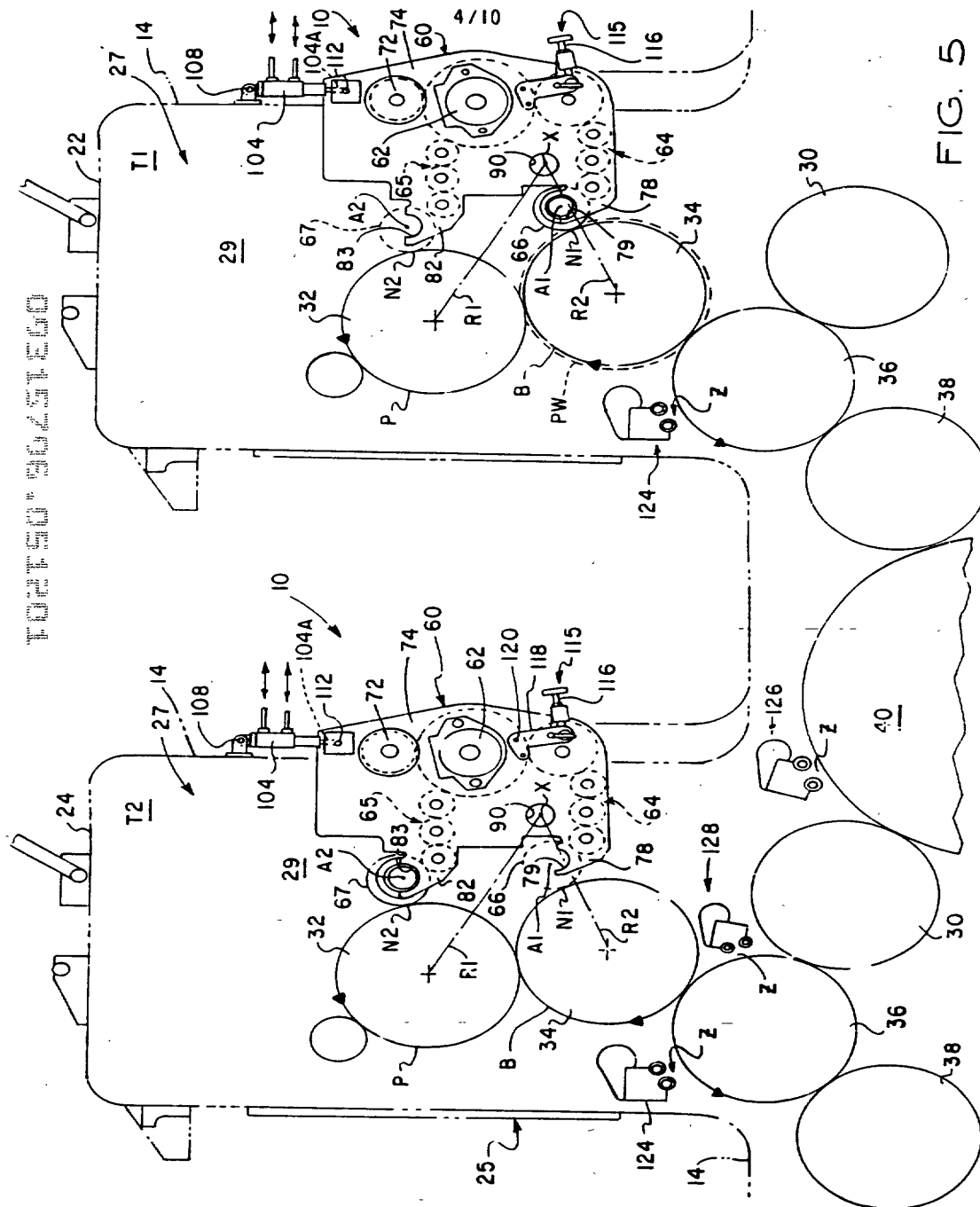


FIG. 4

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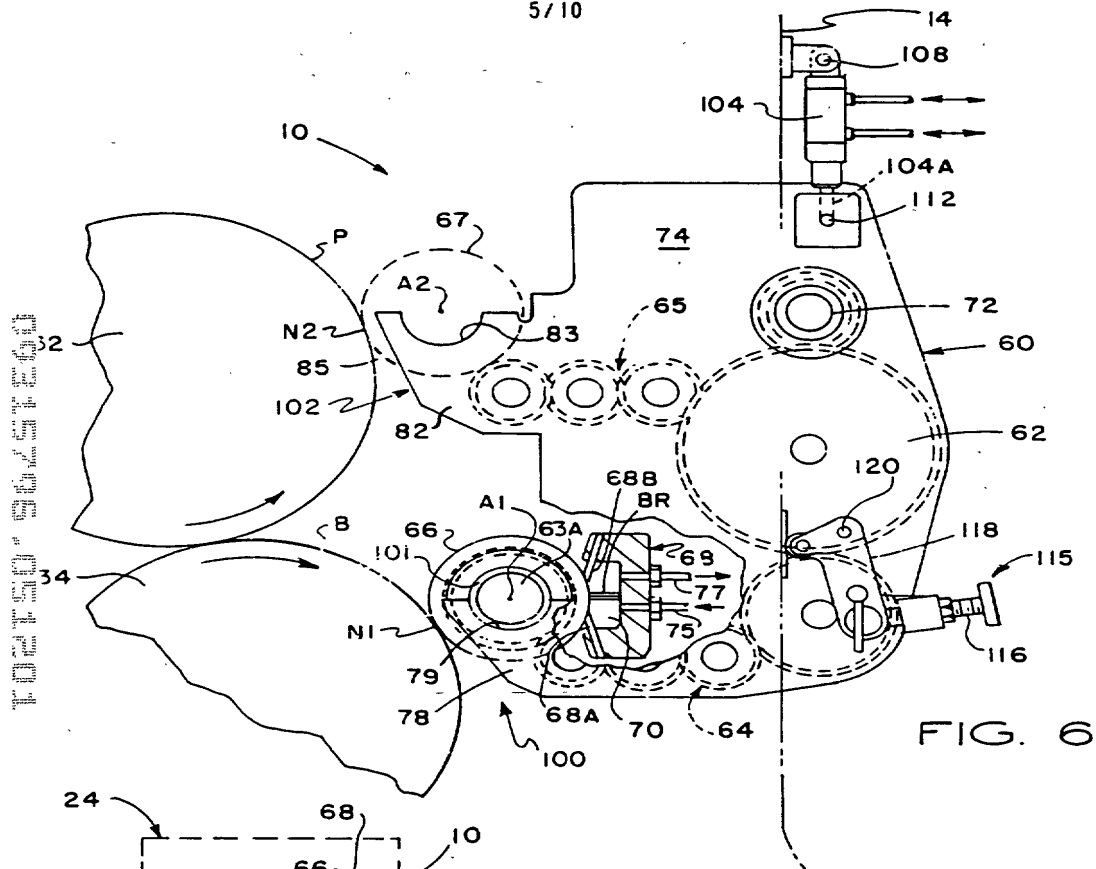


FIG. 6

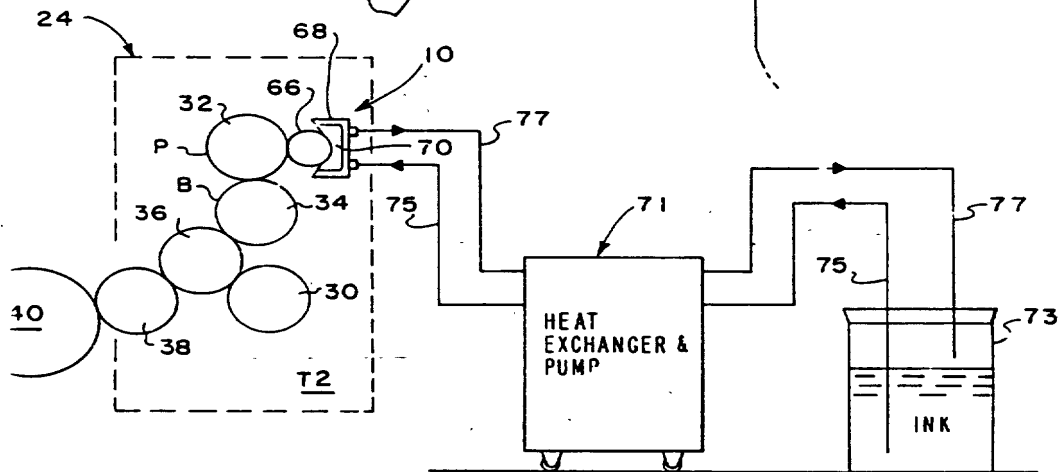


FIG. 7



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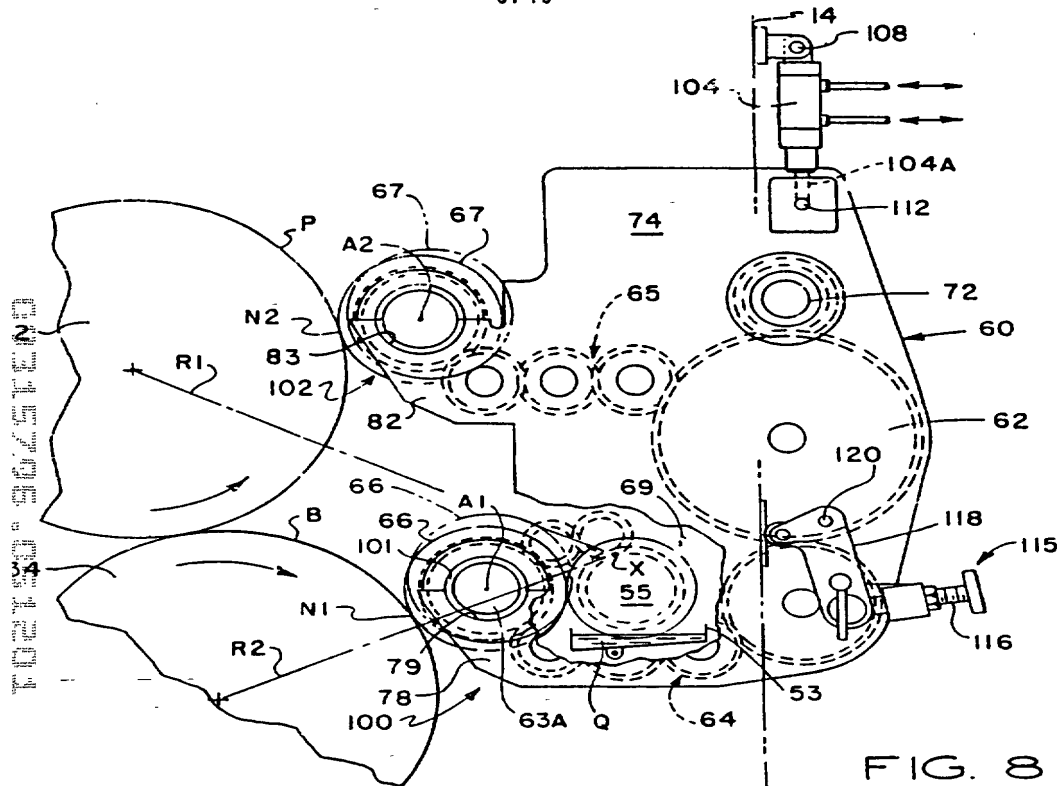
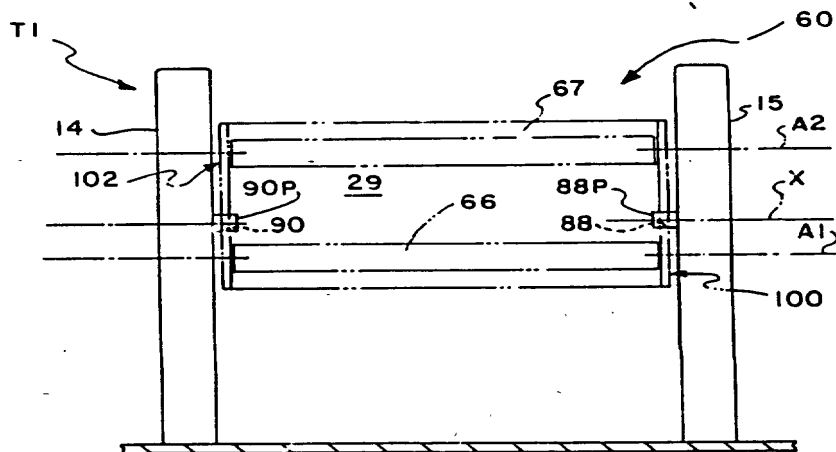


FIG. 8



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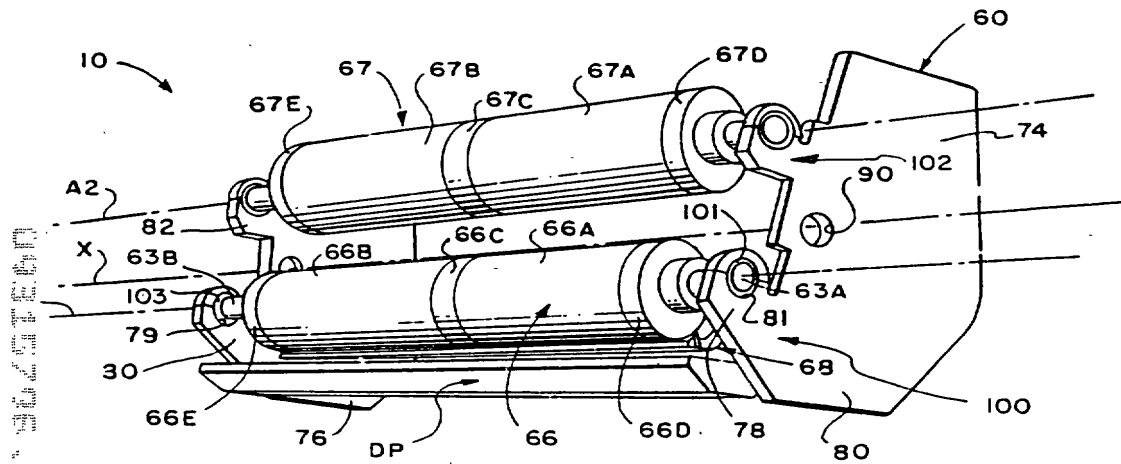


FIG. 10

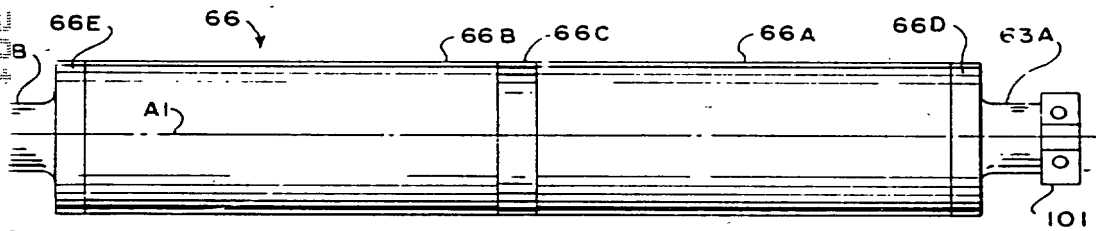


FIG. 11

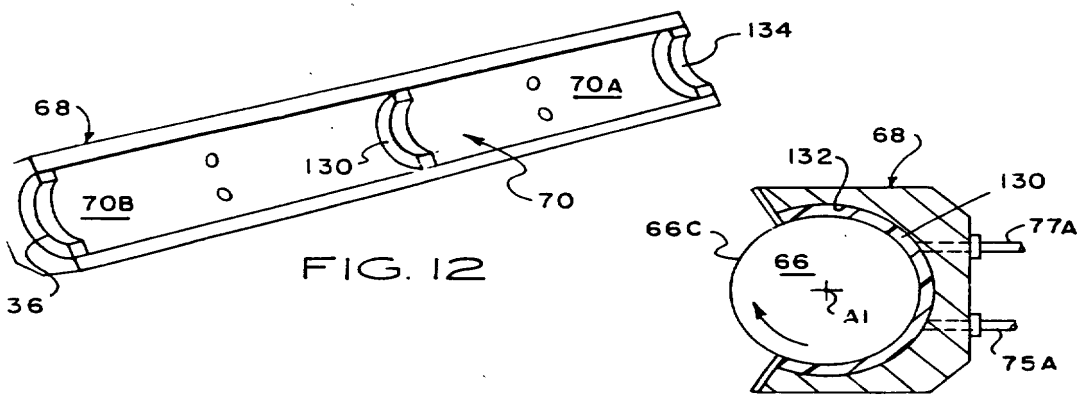


FIG. 12

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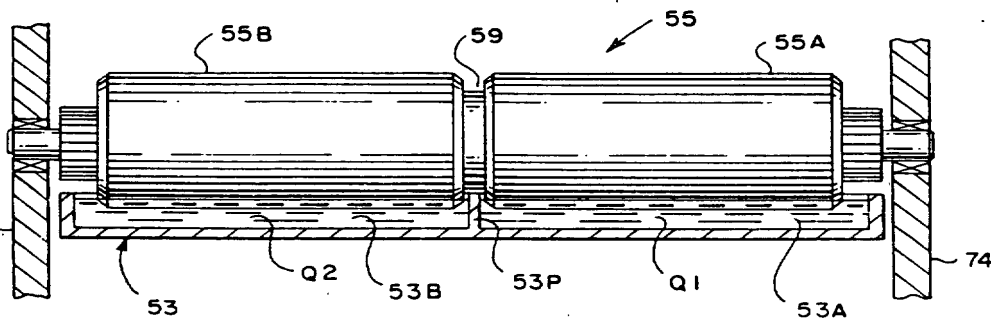
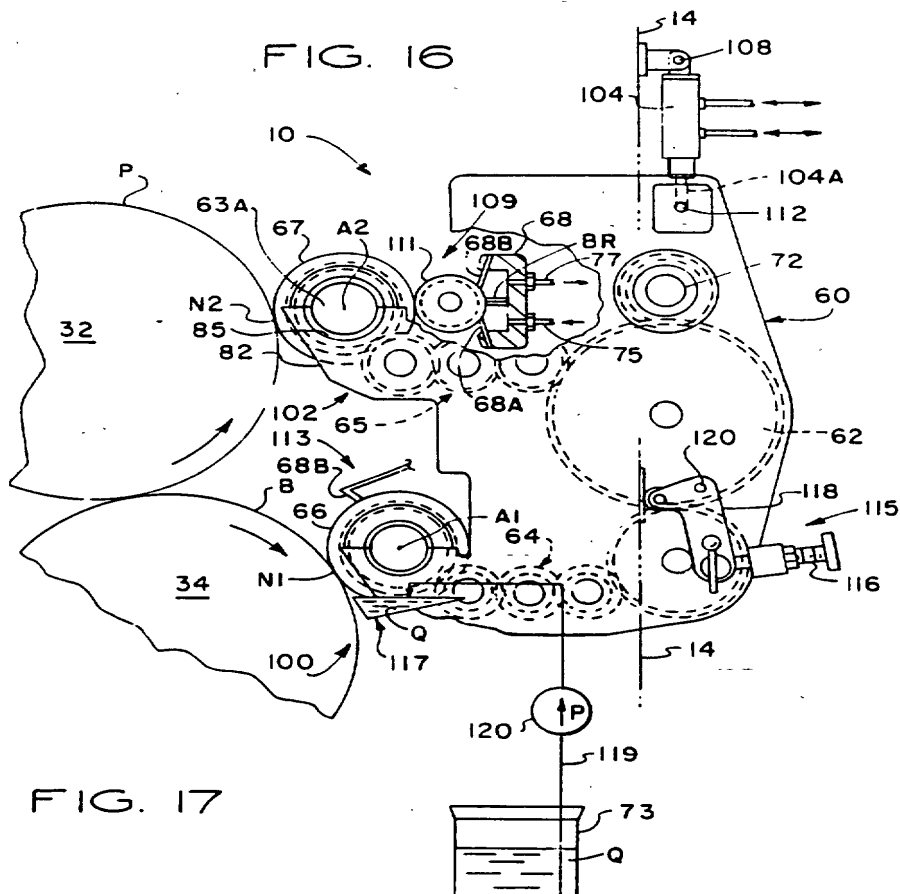


FIG. 16



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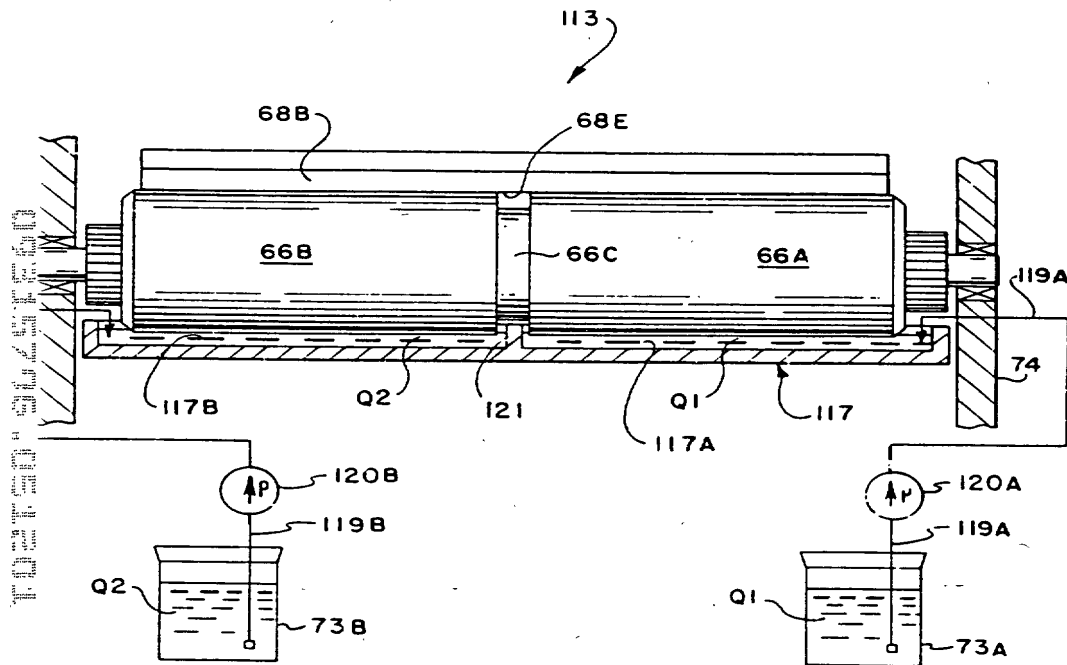


FIG. 18

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DOSSIER NR: 96250217.5 DFIL: 02.10.96

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CLAIMS 11 TO 80 NOT PAID

*1068 mit*



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Zeichen/Ref /Réf <b>P 44215</b>	Anmeldung Nr /Application No /Demande n° //Patent Nr /Patent No /Brevet n° <b>96250217.5-2304-</b>
Anmelder/Applicant/Demandeur//Patentinhaber/Proprietor/Titulaire <b>DeMoore, Howard W.</b>	

**CLAIMS FEES / NOTIFICATION PURSUANT TO RULE 31(1) EPC**

Any European patent application comprising more than ten claims at the time of filing incurs, in respect of each claim over and above that number, payment of a claims fee within one month after the filing of the application (Rule 31(1) EPC).

The claims fees due (for the claims 11 to .. 82..) were not paid within the above-mentioned period. They may still be validly paid within a period of grace of ONE MONTH after notification of this communication. This period of grace is not extendable. If only some of the claims fees due are paid, an indication must be given of the claims to which the payment relates.

If the claims fee for any claim is not paid in due time, the claim concerned shall be deemed to be abandoned (Rule 31(2) EPC).

The present amount of the fee(s) for the eleventh and each subsequent claim is:

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PTE	IEP	FIM									
8500	35	250									

**Note to users of the automatic debiting procedure:**

The normal time limit for payment of the claims fees had already expired when the automatic debit order was received. The claims fees will be debited automatically on the last day of the period of grace (point 11.2 of the Arrangements for the automatic debiting procedure, Supplement to OJ EPO 06/1994).

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**REGISTERED LETTER**

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Zeichen/Ref./Réf. P 44215	Anmeldung Nr./Application No./Demande n°/Patent Nr./Patent No./Brevet n°. 96250217.5-2304-
Anmelder/Applicant/Demandeur/Patentinhaber/Proprietor/Titulaire DeMoore, Howard W.	

## COMMUNICATION

The European Patent Office herewith transmits as an enclosure the European search report for the above-mentioned European patent application.

If applicable, copies of the documents cited in the European search report are attached.

☒ Additional set(s) of copies of the documents cited in the European search report is (are) enclosed as well.

The following specifications given by the applicant have been approved by the Search Division:

☐ abstract

☒ title

☒ The abstract was modified by the Search Division and the definitive text is attached to this communication.

The following figure will be published together with the abstract: 3

## REFUND OF THE SEARCH FEE

If applicable under Article 10 Rules relating to fees, a separate communication from the Receiving Section on the refund of the search fee will be sent later.





DOCUMENTS CONSIDERED TO BE RELEVANT																	
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)														
D, A	US 4 615 293 A (HEIDELBERGER DRUCKMASCHINEN AG) ----		B41F31/30 B41F23/08														
D, A	US 5 107 790 A (RAPIDAC MACHINE CORP.) ----																
A	DE 43 11 834 A (M.A.N.-ROLAND DRUCKMASCHINEN AKTIENGESELLSCHAFT ) -----																
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)														
			B41F														
The present search report has been drawn up for all claims																	
Place of search THE HAGUE		Date of completion of the search 11 March 1998	Examiner Loncke, J														
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 96 25 0217

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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11-03-1998

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EPO FORM P459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82



## ABSTRACT / ZUSAMMENFASSUNG / ABREGE

96250217.5

A retractable in-line inking/coating apparatus can apply either spot or overall inking/coating material to a plate and/or a blanket on the first printing unit or on any consecutive printing unit of any rotary offset printing press. The inking/coating apparatus is pivotally mounted within the conventional dampener space of any lithographic printing unit. The aqueous component of the flexographic printing ink or aqueous coating material is evaporated and dried by high velocity, hot air dryers and high performance heat and moisture extractors so that the aqueous or flexographic ink or coating material on a freshly printed or coated sheet is dry and can be dry-trapped on the next printing unit. The inking/coating apparatus includes dual cradles that support first and second applicator rollers (66/67) so that the inking/coating apparatus can apply a double bump of aqueous/flexographic or UV-curable printing ink or coating material to a plate on the plate cylinder (32), while simultaneously applying aqueous, flexographic or UV-curable printing ink or coating material to a plate or a blanket on the blanket cylinder (34), and thereafter onto a sheet as the sheet is transferred through the nip between the blanket cylinder (34) and the impression cylinder (36). A triple bump is printed or coated on the last printing unit with the aid of an impression cylinder inking/coating unit.

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